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CONTENTS

HATCH, COLEOPTERA OF THE PACIFIC NORTHWEST II. CARABIDAE: BEMBIDIINI 97
ROSS, COLLECTIONS ACQUIRED BY ACADEMY 106
JOHNSON AND THURMAN, AEDES PULLATUS IN CALIFORNIA 107
ROSS, PHILIPPINE ANT SPECIALIST RETURNS 110
BOHART, CALIFORNIA SNOW MOSQUITOES 111
GRIMES, DISTRIBUTIONAL RECORD FOR PLEOCOMA BEHRENSII 118
TILDEN, OVIPOSITION AND BEHAVIOR OF LIRIOMYZA PUSILLA 119
BEAL, GENUS FORMICILLA IN THE UNITED STATES AND MEXICO 122
KROMBEIN, A NEW NITELA FROM CALIFORNIA 130
HURD, NOMENCLATORIAL NOTES ON THE GENUS PEPSIS 132
GRESSITT, TWO NEW ORIENTAL PRIONIDS 134
NINTH INTERNATIONAL CONGRESS OF ENTOMOLOGY 136
ADAMS, NOTES ON OLIARCES CLARA 137
LEWALLEN, BRISTLE DENSITY IN TWO HOUSE FLY STRAINS 138
MELANDER, TAXONOMIC NOTES ON SOME SMALLER BOMBYLIIDAE 139

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1950

THE PAN-PACIFIC ENTOMOLOGIST

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Arrangements have been made for completing vol. 1, and for the publication of volumes 2 (applications in regard to nomenclatural problems), 3 (documents considered by the International Commission on Zoological Nomenclature at Paris, 1948), 4 (Official Record of the International Commission at Paris), and 5 (Official Record of the section on Nomenclature of the thirteenth International Congress of Zoology at Paris, 1948).

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STUDIES ON THE COLEOPTERA OF THE PACIFIC NORTHWEST

II: Carabidae: Bembidiini

MELVILLE H. HATCH

University of Washington, Seattle

The specimens on which this paper is based are in the collection of the author at the University of Washington.

Bembidion (Metallina)[1] keechelus Hatch, sp. n.

Shining black, without aeneous lustre, the first four segments of the antennae below and the legs piceous; head with frontal striae sinuate, divergent behind the anterior supraorbital seta, the eyes large; pronotum about three-fifths as long as wide, widest just in front of middle, the base equal in width to the apex, the side margin strongly arcuate in front, sinuate in front of the nearly rectangular carinate hind angles, the basal impressions deep and bistriate and connected by a feebly impressed feebly rugose transverse impression; elytra with first and eighth striae entire and impressed, the second through the sixth striae feebly impressed, obsolete towards apex, the first through the seventh striae and the scutellar stria coarsely punctate, the eighth distinct from the margin, the third interval with two dorsal punctures distant from the third stria, the marginal line obtusely angulate at the humerus and inwardly prolonged to the base of the fourth stria; mentum with a large entire tooth; length 3.75 mm.

Type: L. KEECHELUS, WASHINGTON, May 3, 1935, Hatch and Wilson. Distinguished from *aleneanum* Csy., *perturbatum* Csy., and *atrolucens* Csy. by its lack of aeneous lustre, and from *dyschirinum* LeC. (*agitabile* Csy.) by the coarser punctures of the elytral striae that become obsolete behind the middle rather than at the middle as in that species.

Bembidion (Trechonepha) rainieri Hatch, sp. n.

Shining black, the trochanters feebly picescent; head, pronotum, and elytra above strongly aeneous and strongly alutaceous, the elytra especially coarsely deeply and opaquely alutaceous; pronotum transversely quadrate, about two-thirds as long as wide, the

[1]For the status of the subg. *Metallina* Mots. in America see Hatch, Jour. N. Y. Ent. Soc. LVII, 1949, pp. 145-146.

apex about six-sevenths as wide as the base, the sides broadly arcuate in front, sinuate and subparallel before the slightly obtuse and carinate hind angles, the median line present at middle and deeply impressed, the apical and basal transverse impressions feeble, the basal impressions large and feebly bistriate and more coarsely alutaceous than the rest of the pronotum; elytra with a scutellar and eight discal striae, the eighth stria deeply impressed, the others feebly impressed except the first, second, and fifth which are well impressed at extreme apex, the striae not or very vaguely punctate, the third stria with two dorsal punctures in large impressed foveae; length 5-5.75 mm.

Type and five paratypes: Mt. Rainier, Washington, Sunrise Park, Sept. 6, 1934, M. H. Hatch. Six paratypes: Sunrise Park, (Aug. 27, 1931), Paradise Park (Aug. 20, 1934; Sept. 27, 1934; July 18, 1937; July 28, 1946), both on Mt. Rainier. The types and paratypes were taken between five and six thousand feet. Differs from previously described North American species of the subgenera *Trechonepha* and *Plataphus* (*Micromelomalus* Csy.) by its coarsely deeply opaquely alutaceous elytra.

Bembidion (Trechonepha) stillaguamish Hatch, sp. n.

Shining black, above finely alutaceous, the basal antennal segment and legs rufous, the elytra rufo-flavous with the lateral margins and epipleurae piceous or rufous, the antennae and abdomen black to rufous; pronotum about three-fourths as long as wide, apex about nine-tenths as wide as base, the carinate hind angles rectangular, the side margins in front of the hind angles subparallel and then sinuate, the median line impressed at middle, obsolete at either end, the anterior and posterior transverse impressions feeble, the large basal impressions vaguely bistriate; elytral striae with eighth strongly impressed, the others feebly but distinctly impressed except the first, second, and fifth, which are strongly impressed at extreme apex, the striae not or very vaguely punctate, the third stria with two dorsal punctures in large impressed foveae, the marginal line arcuate at humerus and extending inward to the fifth elytral stria only; length 3.7-4.6 mm.

Type and eight paratypes: King Co., Washington, Snoqualmie R., Snoqualmie Falls, May 13, 1928, M. H. Hatch. 48 additional paratypes from the following western Washington localities: Chehalis, Duvall, Green R., North Bend (Maloney's Grove), Snoqualmie Falls, Soda Springs (Snohomish Co.), Stillaquamish R., Van Horn, White R. (Mt. Rainier). Two paratypes from Silver Cr. Falls and White R. (Mt. Hood), Ore.

Distinguished from other members of the subgenus by its pale color, narrow elytra, and less extensive basal elytral marginal line.

BEMBIDION (PLATAPHUS[2]) PLANIUSCULUM MANN.

I denominate specimens with pale elytra, legs, and basal antennal segment *Bembidion planiusculum* Mann., ab. *pallidum* nov. Type and five paratypes: PIERCE CO., WASHINGTON, White River, White River Camp, Aug. 27, 1927, M. H. Hatch. 52 paratypes: American R., Ellensburg, Longmire, Mt. Baker, Parkway, Snoqualmie Falls, Sullivan L., Sultan, Swauk C., Wenatchee, White R. Camp, Yakima R. (near Ellensburg), in Washington; Morrissey, B. C.; Cornucopia and Multnomah Falls, Ore. There is some evidence of intergradation with the typical form, but typical examples of the aberration give every evidence of being fully matured rather than teneral individuals. They are distinguished from the pale *B.* (*Trechonepha*) *stillaguamish* described above by the feebly or unimpressed dorsal punctures.

Bembidion (Plataphus) farrarae Hatch, sp. n.

Shining black, the elytra very faintly iridescent, above very finely alutaceous, the extreme bases of the legs picescent; pronotum about two-thirds or slightly more as long as wide, the apex about nine-tenths as wide as base, the side margins in front of the carinate subrectangular hind angles very briefly subparallel and then sinuate, the median line impressed, obsolete at either end, the apical and basal transverse impressions well marked to feeble, the basal impressions bistriate; elytra with striae well impressed, the sixth and seventh more feebly so, the striae vaguely but more or less evidently punctate, the third stria with the two dorsal punctures not or very feebly impressed, the marginal line arcuate at apex and extending to the base of the fourth stria; length 3.2-4.7 mm.

Type and 11 paratypes: MT. RAINIER, WASHINGTON, Sluskin Falls, July 29, 1932. 36 paratypes from the following localities on Mt. Rainier; Longmire, N. Puyallup R., Paradise Park, Ricksecker Point, below Sluskin Falls, Tipsoo L. Named for Mrs. Elizabeth Farrar Kinney who pointed out to me many years ago

[2]Examination of an example of the Palaearctic *B. prasinum* Duft., the type of the subgenus *Plataphus* Mots., convinces me that Casey's *Micromelomalus* is synonymous with *Plataphus*. I have not recognized any of the species (*blanditum* Csy., etc.) that Casey assigned questionably to *Plataphus*, but suspect they belong in his *Trechonepha*.

that our series of "*planiusculum*" was composite. Distinguished from *planiusculum* Mann. by the humeral line attaining the base of the fourth rather than the fifth elytral stria and from *parvulum* Notman by its subrectangular posterior pronotal angles.

Bembidion (Trachelonepha) kincaidi Hatch, sp. n.

Shining black, above finely alutaceous, the legs and elytra and sometimes the occiput and abdomen piceous; head with tempora well developed but not particularly elongate; antennae elongate, about nine-tenths as long as the elytra; pronotum about four-fifths as long as wide, the base not quite as wide as the apex and broadly arcuate, the basal margin within the sharply obtuse hind angles evidently oblique, the side margins in front of the hind angles subparallel and then sinuate, the median line impressed at middle and obsolete at either end, the anterior transverse impression well developed, the basal transverse impression absent, the hind angles obscurely carinate, the basal impressions obscurely bistriate; elytra together about four-sevenths as wide as long, the striae impressed, vaguely punctate, the third stria with two unimpressed dorsal punctures; male with first two tarsal segments dilated and spongey pubescent beneath; length 5.4-5.8 mm.

Type and five paratypes: Mt. Baker, Washington, IX-5-1912, T. Kincaid. Two paratypes: Seattle, Wash., July 30, 1929 and S. F. Skykomish R., Wash., July 4, 1928. Distinguished from *falsum* Blais. and *electum* Csy. by its piceous elytra and from *extensum* Csy. by its shorter elytra (twice as long as wide in *extensum*). Named for my good friend and former chief, Prof. Trevor Kincaid, who has had so many animals named after him that I am sure he will not object to one more!

Bembidion subj. **Pseudoperyphus** Hatch nov.

Type of genus: *Bembidion chalceum* Dej. Established for those species of Casey's subgenus *Peryphus* Steph. in which the seventh elytral stria is better developed, being subequal in its development to the sixth stria and either deeply sulcate and moderately punctate as in *chalceum* Dej. and *reticolle* LeC. or coarsely punctate and feebly impressed as in *nigrum* Say, *concolor* Kby., *quadrulum* LeC., and *longulum* LeC. In general the group appears to include the species in the second part of Hayward's *honestum*-group (the humeri not being truly angulate) and in his *concolor*-group, and appears to include the species between 512 and 531 inclusive and between 589 and 593 inclusive in the Leng catalogue. As a

result, *Peryphus* is restricted to species with the seventh elytral stria reduced to an unimpressed sometimes subobsolete series of minute punctures.

Bembidion (Peryphus) immaculosum Hatch, sp. n.

Shining black, the elytra sometimes with faint piceous tinge, the legs picescent towards extreme base; pronotum about three-fifths as long as wide, the apex nearly nine-tenths as wide as the base, the carinate hind angles subobtuse or nearly rectangular, the side margins in front of the hind angles broadly sinuate curving out almost immediately, the anterior and posterior transverse impressions distinct, the latter coarsely vaguely punctate, the median line distinct behind the anterior transverse impression, the basal impressions large, bistriate, tuberculate; elytra with the striae moderately finely punctate for the basal two-thirds and finely impressed, the seventh stria an unimpressed series of punctures, the eighth stria deeply impressed and impunctate; length 4.2-5.8 mm.

Type and four paratypes: SPOKANE, WASHINGTON, July 15, 1927, M. C. Lane coll. 19 paratypes: Ewan, Hooper, Kahlotus, Newman L., Pullman, Ritzville, and Upper Grand Coulee in eastern Washington and Condon and Tygh Valley, Oregon. Related most closely to *nevadense* Ulke, from which it is distinguished by its immaculate elytra and of which it may be a color variety. Hayward (Trans. Am. Ent. Soc. XXIV, 1897, p. 76) says of *nevadense*: "Prothorax . . . as wide at base as apex," whereas I find the base about one-tenth wider than apex. This is mentioned to call attention to a systematic error in Hayward's monograph of over-estimating the width of the apex of the pronotum relative to the base, as revealed by a precise micrometer measurement from the crest of one anterior angle to the crest of the other.

Bembidion (Peryphus) wenatchee Hatch, sp. n.

Shining black, legs and antennae rufous, segments four to eleven of antennae with the apical portions more or less fuscous, elytra finely alutaceous and rufous, the scutellar region, a mediolateral area, and the apex darker, separate subapical and humeral spots flavate, abdomen sometimes rufous; pronotum nearly seven-tenths as long as wide, the apex about nine-tenths as wide as base, the side margins before the carinate subrectangular hind angles subparallel and then sinuate, the transverse apical impression feeble, the transverse basal impression moderate and feebly rugose, the impressed median line present between the transverse apical and transverse basal impressions, the basal impressions bi-

striate; elytral striae impressed, obsoletely so towards apex, moderately punctate towards base, more finely to obsoletely so behind middle; length 5.8-6.3 mm.

Type: WENATCHEE, WASHINGTON, August 22, 1932, M. H. Hatch. Three paratypes: Moses Coulee, Wash.; Vantage, Wash.; Gold Hill, Ore. Distinguished from northwestern specimens of *rupicola* Kby. (*lucidum* LeC., *substrictum* LeC.) by its larger size (length 4.6-5.2 mm. in *rupicola*) and black rather than rufous body color. *Ustulatum* L. is distinguished by its darker elytral ground color, its smaller size (length 5.4-6.0 mm.) and the subequal width of the pronotal apex and base.

Bembidion (Peryphus) fenderi Hatch, sp. n.

Dark rufopiceous to rufous, shining, the elytra finely alutaceous, the legs, antennae, and mouthparts rufous, the elytra with the subapical and humeral spots virtually confluent resulting in a flavate elytra with only a common scutellar triangle and the apices darker, the suture variably dusky; pronotum about five-sevenths as long as broad, the apex about ninety-five percent as wide as the base, the side margins in front of the carinate hind angles subparallel and then sinuate, the apical and basal transverse impressions evident, the basal impressions bistriate; elytral striae finely impressed, finely distinctly punctate especially before the middle; length 5.8-7.0 mm.

Type and eight paratypes: SEAVIEW, WASHINGTON, July 25, 1930. 22 paratypes: Fort Canby, Long Beach (Pacific Co.), Moclips, Ocean Park, Oysterville, Sea View, Snag Is. (Pacific Co.), all in Washington. 19 paratypes: Cannon Beach, Gold Beach, Sea Side, Tillamook, Woods, all in Oregon. Apparently confined to the sea beach. Named in honor of my friend and collaborator, Mr. Kenneth M. Fender of McMinnville, Ore. This species is distinguished from other northwestern species of the same subgenus by the virtually confluent subapical and humeral elytral spots. Its averagely larger size and finely impressed elytral striae are likewise highly diagnostic. I place it next to *rupicola* LeC. and *wenatchee* Hatch (see above) in the classification.

Bembidion (Notaphus) aberti Hatch, sp. n.

Dark rufous, shining, the head evidently alutaceous, the pronotum and elytra nearly smooth, the antennae, legs, and most of

the elytra somewhat paler, the latter with obscurely darker areas about the scutellum, towards the median lateral margins, and towards the apex; pronotum nearly three-fourths as wide as the elytra together, about seven-eighths as long as wide, the apex not quite as wide as the base, the side margins in front of the somewhat variably minutely rectangular carinate hind angles briefly and feebly sinuate, the median line fine, the transverse apical impression feeble, the transverse basal impression rugose, the basal impressions bistriate; elytra with striae distinctly impressed and entire, distinctly punctate basally becoming obsoletely punctate to impunctate behind the middle, the third interval with two dorsal punctures; length 3.8-4.4 mm.

Type and eight paratypes: L. ABERT, OREGON, June 16, 1938, M. H. Hatch. Distinguished from *obtusangulatum* LeC. by its general rufous color. It most closely resembles *scudderi* LeC., from which it is distinguished by the third elytral interval possessing two rather than three dorsal punctures, its smaller size, more rufous body, and less distinctly alutaceous elytra.

Bembidion (s. str.) alutaceum Hatch, sp. n.

Black, shining, the legs except the apices of the femora piceous; head and pronotum very finely alutaceous; pronotum cordate, nearly four-fifths as long as wide, the base about nine-tenths as wide as the apex, the side margins narrowly reflexed, the sides in front of the minutely prominent carinate hind angles briefly subparallel and then sinuate, the hind margin just within the hind angles emarginate, the anterior transverse impression vague, the median line entire in front of the basal transverse impression which is deep and rugose with foveiform impressions between the rugae; elytra evidently alutaceous with a nebulous small subhumeral testaceous spot, the striae coarsely punctate and evidently impressed to apical fourth or fifth behind which both striae and punctures become obsolete; length 3 mm.

Type: BLUE MTS., OREGON, MOTTET MEADOW, Sept. 19, 1937, M. H. Hatch. Runs to *mutatum* G. and H. and *vegetum* Csy. in Casey's key (Mem. Coll. VIII, 1918, p. 151), from which it is distinguished by its more evidently alutaceous elytra with smaller subhumeral spot and more coarsely punctate more evidently impressed striae.

The two following new species of *Bembidion* subgenus *Diplocampa* Bedel belong to the *digressum*-group of Casey (Mem. Col. VIII, 1918, p. 155) characterized by alutaceous elytra. Hayward

(Trans. Am. Ent. Soc. XXIV, 1897, pp. 124-127) did not refer to this character in his treatment of the group, but I find the elytra nearly smooth in his *acutifrons* LeC., *cautum* LeC., and *assimile* Gyll. Casey found them smooth in *connivens* LeC. and *habile* Csy.

Bembidion (Diplocampa) elizabethae Hatch, sp. n.

Black, sometimes tinged with piceous, the basal antennal segment and the legs paler, the elytra usually with a brownish tinge, a lateral anteapical spot flavate, the apex and sometimes the suture and a vague humeral area variably and vaguely paler; elytra evidently microreticulate, the head and pronotum nearly smooth with only the faintest trace of microreticulation; pronotum about four-fifths as long as wide, the base subequal to the apex in width, the sides narrowly reflexed, usually briefly subparallel in front of the rectangular carinate hind angles, the basal impressions deep and bistriate, the anterior transverse impressions vague, the median line distinct, abbreviated towards apical and basal margins, the basal transverse impression deep, coarsely punctate; elytral striae impressed, coarsely punctate, the intermediate striae and the punctures more or less obsolete at apical third or fourth; length 2.8-3.2 mm.

Type and 7 paratypes: King Co., Washington, Licten Springs, May 27, 1932, E. Farrar. 63 paratypes: Bay Center, Bothell, Cedar Mt., Chase L. (Snohomish Co.), Chehalis, Duvall, Evans Creek (King Co.), Enumclaw, Fall City, Fidalgo Is., Friday Harbor, Lewis and Clark State Park, Loveland, Martha L. (near Edmonds), Mt. Rainier (Paradise Park), Nasel R., Olympia, Plantation Pond (Seattle), Seattle, Silver L. (Snohomish Co.), Snoqualmie Falls, Sterling, and Vashon, all in western Washington. 3 paratypes: Dayton and McMinnville (K. M. and D. M. Fender, coll.), in western Oregon. I take pleasure in naming this species likewise for Mrs. Elizabeth Farrar Kinney.

From previously described species of the *digressum*-group *elizabethae* is distinguished by its smaller size, from *digressum* Csy. by its black ventral surface, and from *digressum* and *concretum* Csy. by its less transverse pronotum. From *anguliferum* LeC. it is further distinguished by its nearly smooth head and pronotum, its subequal pronotal base and apex, and by its distribution, being confined as far as at present known to the region west of the Cascade Mountains.

Bembidion (Diplocampa) microreticulatum Hatch, sp. n.

Black, the elytra frequently piceous or rufo-piceous with the apex sometimes vaguely paler, the basal antennal segment and legs piceous or rufo-piceous; elytra microreticulate, more finely so in male, the head and pronotum nearly smooth; pronotum about three-fourths as long as wide, the base and apex about equal in width, the sides of the pronotum narrowly reflexed, the side margins in front of the slightly obtuse carinate hind angles slightly to scarcely divergent and broadly sinuate, the basal impressions deep and bistriate, the anterior transverse impression vague, the median line fine, abbreviated towards the anterior and posterior margins, the basal transverse impression deep and punctate; elytral striae impressed, more feebly so towards side, moderately punctate, the intermediate striae and the punctures obsolete at apical fourth; length 3.3-3.8 mm.

Type ♂ and 2 paratypes (♂ and ♀): STICKNEY L., WASHINGTON, May 8, 1931, M. H. Hatch. 12 paratypes: Bothel, Dry Falls (Grand Coulee), Evans Cr. (King Co.), Martha L. (near Edmonds), Mt. Adams, Satus Creek, Seattle, Stickney L., Tieton Dam. Distinguished from other members of the *digressum*-group by its immaculate elytra. From *anguliferum* LeC. and *elizabethae* Hatch it is further distinguished by its somewhat more elongate form. From *acutifrons* LeC., which is likewise immaculate, it is distinguished by its microreticulate elytra and its more finely punctate elytral striae.

TACHYS (TACHYURA) PARVULUS DEJ.

This species is a native of south middle and southern Europe including southern England (Jeannel, Faune de France 39, 1941, p. 437), and has not before been recorded from North America. I have five specimens collected in western Washington: two from the University of Washington campus, Seattle, April 9, 1940; two from Cedar Mt., southeast of Seattle, May 22, 1941, and one, same locality, May 15, 1945. It is distinguished from other European and American species of the subgenus (Group IV of Hayward) by its entire impressed marginal elytral stria, and may be described briefly as follows:

Dark rufous, shining, the basal antennal segments and legs paler, the elytral apex evanescently paler; pronotum about seven-tenths as long as wide, the apex nearly as wide as base, the sides oblique in front of the briefly carinate hind angles, the anterior transverse impression vague, the basal transverse impression deep,

punctate, with three enlarged punctures at middle, the basal impressions obsolete; elytra with an entire impressed sutural and a marginal stria, the latter with one or two seta-bearing punctures anteriorly and about four such punctures posteriorly, the disc with four or five finely impressed striae abbreviated at about apical third, the striae not or obscurely punctate, the third stria with two dorsal punctures; length 2 mm.

SOME COLLECTIONS RECENTLY ACQUIRED BY THE CALIFORNIA ACADEMY OF SCIENCES

THE DUDLEY MOULTON COLLECTION OF THYSANOPTERA (Purchase). During the past year the Academy was fortunate enough to secure this important collection together will all of Moulton's literature and papers pertaining to the thrips. This collection is world-wide in scope, rich in Moulton types, and in those of other leading thysanopterists. It comprises some 25,000 slides.

THE HEWES COLLECTION OF LEPIDOPTERA (Bequest). Comprising 6572 neatly mounted and completely labelled specimens, this collection results from a nearly successful lifetime effort to acquire every kind of butterfly listed for America north of Mexico. Included in this number is a smaller collection of moths and one of foreign butterflies. The late Dr. Laurence I. Hewes was by profession one of the foremost U. S. highway engineers. His zeal as an amateur lepidopterist was well expressed in his article "Butterflies—Try and Get Them" (National Geographic Mag. 69:667-678, 1936).

THE MAEHLER COLLECTION OF COLEOPTERA (Gift). This is a general collection of North American beetles especially rich in Meloidae because of Mr. K. L. Maehler's special interest in the family. The collection totals 6159 specimens.

THE HUBBARD INDEX COLLECTION OF THE FLEAS OF NEVADA (Gift). Dr. C. Andresen Hubbard of Tigard, Oregon, has distributed among several institutions a number of index collection of the fleas of Nevada, to be used in reference to his publication on this subject (Bull. S. Cal. Acad. Sci., 48:115-128, 1949). The collection received by the Academy is made up of 46 slides representing as many species.—E. S. Ross.

THE OCCURRENCE OF AEDES (OCHLEROTATUS) PULLATUS (COQUILLETT), IN CALIFORNIA[1]

(Diptera: Culicidae)

BY PHYLLIS T. JOHNSON AND
ERNESTINE B. THURMAN

Entomologists, Bureau of Vector Control, California State Department of Public Health, Berkeley, California

The collection of *Aedes* (*Ochlerotatus*) *pullatus* (Coquillett), 1904 in Tuolumne Meadows, Yosemite National Park, Tuolumne County, on June 27, 1949, brings the total number of recognized species and subspecies of the mosquito fauna in California to 39[2] (Reeves, 1941; Bohart, 1948). *A. pullatus*, a dark-legged snow mosquito has a wide distribution, having been reported from the Alps of Europe (Dyar, 1922), Alaska, and the Yukon south along the Rocky Mountains to Colorado (Matheson, 1929; 1944), and in Montana (Mail, 1934), Utah (Rees, 1934; 1942), Idaho (Harmston and Rees, 1946), Oregon (Gjullin, personal communication), and Washington (Boddy, 1948).

Fourth instar larvae and pupae of *A. pullatus* were collected with third instar larvae of *Culiseta incidens* (Thomson) and *Culiseta* sp. from two small sunlit depressions which were void of vegetation in temporary water courses formed by melting snow. At this elevation, 8600 feet, the snow had melted by the 19th of June, and at the time of the collection only the depressions contained water. From 66 larvae collected, 6 males and 24 females were reared in correlated series and an additional 32 males and 22 females were reared from pupae. Females of *A. pullatus* were taken in biting collections in association with *Aedes ventrovittus* Dyar, *A. hexodontus* Dyar, *A. fitchii* (Felt and Young), *A. communis* (DeGeer), and *Culiseta incidens* from the Tuolumne Meadows Public Campground area.

[1]From Bureau of Vector Control, California State Department of Public Health, and the Communicable Disease Center, Public Health Service, Federal Security Agency, Atlanta, Ga.

[2]Excludes *Anopheles pseudopunctipennis franciscanus* var. *boydi* (Vargas) (Reeves, 1941) and *Anopheles punctipennis* var. *perplexens* Ludlow collected at Hamilton Field, Marin County, July 28, 1944 (H. H. Dodge), determined by Dr. George H. Bradley, reference letter of November 25, 1944, unpublished record on file in the Bureau of Vector Control.

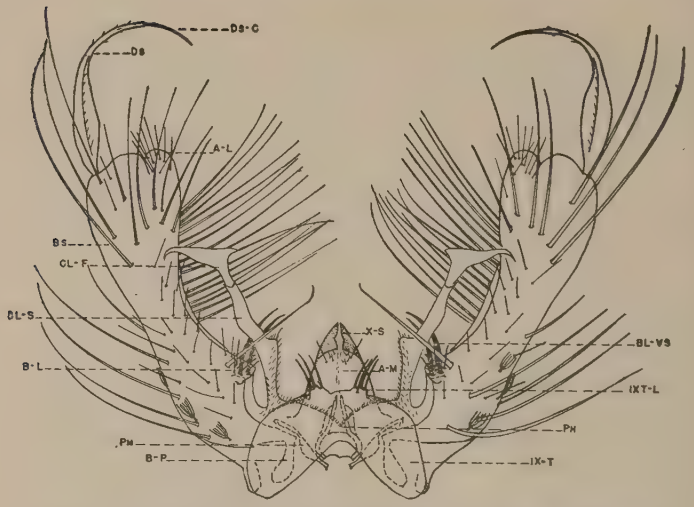

Figure 1. Diagram of the structures of the male terminalia of *Aedes pullatus* (Coquillett), 1904

Legend:*

A-L	apical lobe
A-M	anal membrane
B-L	basal lobe
BL-VS	ventral spines of basal lobe
B-P	basal plate
Bs	basistyle
CL-F	filament of claspette
CL-S	stem of claspette
Ds	dististyle
Ds-C	claw of dististyle
Ix-T	ninth tergite
IXT-L	lobe of ninth tergite
Ph	phallosome
Pm	paramere
X-S	tenth sternite

*Terminology follows that employed by Carpenter, Middlekauff and Chamberlain (1946, p. 84).

Specimens of *A. pullatus* have been deposited in the collection of the Academy of Sciences, San Francisco, California; the U. S. National Museum; and the Communicable Disease Center, Public Health Service, Atlanta, Georgia.

The structures of the male terminalia are refigured for the purpose of more accurately illustrating the position of the curved spines on the ventral surface of the basal lobe of the basistyle. Dyar (1928, Plate XXXVIII, No. 125) and Matheson (1944, Plate XVII, No. 6) figure the spines as arising in the same dorsal plane with the lobes of the ninth tergite. Dyar (1928, p. 171) is of the opinion that the basal lobe is obsolete, "but a large, strong spine remains, inwardly of which are two short curved spines connected by chitin." Matheson (1944, p. 178) describes the basal lobe as "small, with a prominent spine and 2 or 3 adjacent small ones and a few setae; the inner margin of the basal lobe turns ventrad, then outward and caudad, to end in a short, chitinous, stout stem which bears 2 apical, large, curving spines."

In a mounted specimen flattened by the weight of the cover glass and insufficient mounting medium, the folded basal lobe appears to be as previously figured. In a wet mount with the structures in normal position, the basal lobe appears to be small, rounded, with a single prominent spine and 3 or 4 smaller ones on the dorsal surface, a few setae scattered over the area curving ventrad. From the ventral apex arise two spines, somewhat shorter than the dorsal spine, curving dorsally from beneath the stem of the claspette. There does not appear to be a "short, chitinous, stout stem" from the ventral surface of the basal lobe.

An additional correction may be mentioned in the number of spines found on the lobes of the ninth tergite. Matheson (1944, p. 178) lists "7-9 stout spines" and figures only 3 (Plate XVII, No. 6). Dyar mentions and figures 5-6 spines in his description. Specimens involved in the current study have demonstrated from 3 to 6 spines on the lobes of the ninth tergite.

ACKNOWLEDGMENTS

The authors are pleased to extend special acknowledgments to Mr. C. W. Gjullin and Mr. W. W. Yates, U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine, Corvallis, Oregon, for the privilege of comparing the specimens with those in the collection in Corvallis and for confirming the identification of all *Aedes* species listed herein; to Dr. Martin W. Johnson, Scripps Institution of Oceanography, University of California, and Miss Mary Lou Beaty, University of California, for assisting in the collection of the specimens; and to D. C. Thurman, Jr., S. A. San, PHS, and to Harry D. Pratt, Scientist, PHS, for offering valuable suggestions in all phases of the study and reviewing the manuscript.

References Cited

Boddy, D. W.
1948. An annotated list of the Culcidae of Washington. Pan-Pac. Ent., 24(2):85-94.

Bohart, R. M.
1948. The subgenus *Neoculex* in America north of Mexico (Diptera, Culcidae). Ann. Ent. Soc. Amer., 41(3):330-345.

Carpenter, S. J., Middlekauff, W. W., and Chamberlain, R. W.
1946. The Mosquitoes of the Southern United States East of Oklahoma and Texas. Univ. Press, Notre Dame, Ind., 292 pp.

Dyar, H. G.
1922. The mosquitoes of the United States. Proc. U. S. Nat. Mus. No. 2447, 62(1):1-119.

Harmston, F. C. and Rees, D. M.
1946. Mosquito records from Idaho. Pan-Pac. Ent. 22(4):148-156.

Mail, G. A.
1934. The mosquitoes of Montana. Mont. State College, Agric. Exp. Sta., Bull. No. 288, 72 pp.

Matheson, R.
1929. A Handbook of the Mosquitoes of North America. C. C. Thomas, Springfield, Ill., 274 pp.
1944. A Handbook of the Mosquitoes of North America. Comstock Pub. Co., Ithaca, N. Y., 313 pp.

Rees, D. M.
1942. The mosquitoes of Utah. Bul. Univ. of Utah, 33(7):1-99.
1943. Supplementary list of mosquito records from Utah (Diptera, Culicidae). Pan-Pac. Ent. 43(2):77-82.

Reeves, W. C.
1941. List of the mosquitoes of California. Supplement to Proc. Calif. Mosq. Control Assn. 16 pp.

PERSONAL NOTE: JAMES W. CHAPMAN

Dr. James W. Chapman, Chairman of Science Faculty, Emeritus, Silliman University, Dumaguete, Oriental Negros, Philippine Islands, and well known specialist on Philippine ants, has recently retired to the U. S. He is currently studying at the California Academy of Sciences. In September Dr. Chapman will move to Pasadena for the winter and plans then to take up residence near the Museum of Comparative Zoölogy at Harvard.

After 35 years of Philippine field work and teaching he expects to prepare for publication his comprehensive studies on the taxonomy and ecology of Philippine ants. Dr. Chapman was a member of Dr. William Morton Wheeler's first entomology class at Harvard and later supplied Wheeler with much of his study material from the Philippines.—E. S. Ross.

OBSERVATIONS ON SNOW MOSQUITOES IN CALIFORNIA

(Diptera: Culicidae)

BY RICHARD M. BOHART

University of California, Davis

In the course of a general study of Californian mosquitoes a number of collections were made during the spring months of 1947, 1948 and 1949 in the central and northern Sierra. These included many of the so-called "snow *Aedes*", the larvae of which breed in pools resulting more or less directly from melting snow. These species are characteristic of the colder parts of North America including northern United States, and some of them extend their range south at progressively higher altitudes along the mountain ranges.

The snow *Aedes* are mainly in the subgenus *Ochlerotatus* which contains some of the most difficult species of mosquitoes taxonomically speaking. The females are separated largely on the scutal pattern and as this is subject to some variation, no existing key is entirely satisfactory. Differences in the male genitalia are mostly slight, particularly between closely related species. The larvae offer some of the best characters, but these are unfortunately plastic and few published descriptions have given the range of variation. Keys are frequently based on the exact branching of the head hairs or the number and shape of the comb scales which may result in exclusion of 10 to 25 per cent or more of a variable population. Some of these variations are discussed below.

Eight species have been known to occur in California and a ninth is herein added to the list. Also, personal locality and date records are given for the benefit of collectors in the future.

AEDES INCREPITUS Dyar

This species is the most widespread snow mosquito in California. It occurs in various parts of the state from 7,500 feet elevation to practically sea level. At lower elevations its outbreaks are worst following extremely cold winters. The larvae are found

in shade or sun, in meadows or roadside ditches, in pine-needle pools or water in dense willow thickets, in hoofprints or in large ponds. The adults are the chief open sun, day-biting mosquito of the Sierra at elevations of 6,000 to 7,000 feet.

The larvae are similar to those of *communis* except that the upper head hairs (C) are usually double or triple and the lower head hairs (B) are single or double. However, this distinction does not always hold. In 50 specimens selected at random from a collection made from a large willow-shaded pool near Alturas, Modoc Co., 52 of the upper head hair are single, 46 are double, and 2 are triple, giving an average of 1.5 branches. Furthermore, 17 of the 50 specimens have all 4 of the head hairs single. This same tendency toward singleness is present in a collection from a large willow-shaded pool near Susanville, Lassen Co. Here, a check on 21 specimens reveals 10 upper head hairs single, 29 double and 3 triple, giving an average of 1.8 branches. These figures can be compared with a coast range collection made in Sonoma Co. where 14 specimens have 27 upper head hairs double and 1 triple for an average of 2.0 branches. A further comparison can be made with Sierran material in which 18 larvae from several central Sierran localities have 13 upper head hairs double, 21 triple and 2 quadruple for an average of 2.7 branches. Furthermore, of the lower head hairs, which are almost invariably single from other localities, 6 out of 36 in the central Sierran material are double. The Susanville and Alturas specimens are distinguished by having most of the comb scales very broad, whereas only a few of the scales are of this type in the material from the other localities mentioned. The broadened comb scales and frequently single head hairs increase the chance of misidentifying single larvae as *communis*. However, the comb scales of *increpitus*, even when stout, are pointed instead of rounded at the tip as in *communis*.

Personal records of larval collections are as follows: Chimney Rocks near Alturas, Modoc Co., May 24, 1949; Canyon Dam, Plumas Co., April 30, 1947; Susanville, Lassen Co., May 8, 1948; Calpine, Sierra Co., April 29, 1947; Little Truckee River near Lake Tahoe, Eldorado Co., June 1, 1947; Grass Lake (Luther Pass), Eldorado Co., May 21, 1948; Meyers Meadows, Eldorado Co., May 21, 1948; Emigrant Gap, Placer Co., April 29, 1947; 7 miles west of Sonora Pass, Tuolumne Co., April 4, 1949; Cordelia, Solano Co., April 6, 1949.

AEDES FITCHII (Felt and Young)

This is one of the two snow mosquitoes in the state with banded tarsi, the other being *increpitus*. Adults can be distinguished by the more uniform distribution of white scales on the wing of *fitchii*. The species is relatively uncommon but when found, the females bite readily in light shade. The larvae seem to prefer sunlit ponds of moderate size, particularly if they contain tules. Personal collecting records of larvae are from Sierraville, Sierra Co., April 29, 1947; Little Truckee River near Lake Tahoe, June 1, 1947; and near Baxter, Placer Co., April 29, 1947.

AEDES COMMUNIS (DeGeer)

This species is abundant and widespread at elevations of 5,000 to 6,000 feet in the northern Sierra and 6,000 to 8,500 feet at the latitude of Tuolumne Co. The larvae are almost always restricted to shaded pine needle pools. The adults bite in deep shade during the day but are particularly troublesome at dusk. There is frequent association with *hexodontus* and both species in the female have a short pale basal costal spot, all dark palpi, front surface of the mid femur unevenly and not contrastingly speckled, and no hypostigial spot. Females of *communis*, however, usually have the outer surface of the torus yellowish; mixed pale and dark upright vertex scales (in California specimens); the scutum with a median, often split, golden line; and the supra-alar bristles dark.

Personal larval records are: Canyon Dam, Plumas Co., April 30, 1947; Calpine, Sierra Co., April 29, 1947; near Baxter, Placer Co., April 29, 1947; Cisco Grove, Placer Co., April 29, 1947; Camp Sacramento, Eldorado Co., May 17, 1947; Carson Pass, Alpine Co., April 29, 1947; Blue Lakes, Alpine Co., July 12, 1948; 7 miles west of Sonora Pass, Tuolumne Co., June 10, 1948.

AEDES HEXODONTUS Dyar

Although larvae of this species do not occur in the tremendous swarms in which *communis* are found, it is more catholic in its requirements both as to altitude and type of breeding place. It is often found in shaded pine-needle pools with *communis* but also in the open sun in meadow pools and hoofprints. I have collected it from 5,000 to 9,500 feet and it probably occurs at still higher elevations. Adult females are often confused with *com-*

munis but the torus in *hexodontus* is dark, the upright vertex scales are yellow, the scutum has a broad median brownish-yellow band and the supra-alar bristles are yellow.

In the larvae the complete sclerotized ring of the anal segment is unique among the California species of snow *Aedes*. Other characters are as follows: In 41 specimens (34 individually reared) from 10 different localities, 1 has 9 comb scales, 3 have 8 scales, 7 have 7 scales, 50 have 6 scales and 21 have 5 scales, giving an average of 5.94 scales. The upper head hairs vary from single to triple, the average being 1.9 branches. The lower head hairs are single or double, the average being 1.8 branches. The variation in siphon tuft branches is 4 to 9 with an average of 6.1 branches.

According to Matheson (1944), "*hexodontus* should probably fall as a synonym of *A. punctor*." Knight (1948) theorizes that *hexodontus* represents a western subspecies of *punctor* and that specimens which he studied from Umiat, Alaska represent an extreme of *hexodontus*. This problem evidently needs more study. Matheson's *punctor* has the head hairs (C and B) usually double, the comb of 8 to 17 scales in a double row and the siphon tuft with 3 or 4 branches. Knight's *punctor* (or *hexodontus*) from Alaska has the head hairs usually single, the comb of 5 to 13 (usually 7 to 8) scales, and the siphon tuft with 3 to 6 branches. As contrasted with these, California *hexodontus* have the head hairs usually double, the comb of 5 to 9 (usually 5 or 6) scales and the siphon tuft usually with 5 to 7 branches. Differences in female scutal pattern are also present, though somewhat variable. If it seems desirable to separate the Alaskan material, it will fall under either *cyclocerculus* Dyar or *punctodes* Dyar. In the meantime it appears best to place the Californian material under *hexodontus* as a distinct species.

Personal larval records are: Greenville, Plumas Co., May 8, 1948; Yuba Pass, Sierra Co., April 30, 1947; Calpine, Sierra Co., April 29, 1947; Hampshire Rocks Camp, Nevada Co., April 29, 1947; Little Truckee River, Eldorado Co., June 1, 1947; Meyers Meadows near Lake Tahoe, Eldorado Co., May 21, 1948; Camp Sacramento, Eldorado Co., June 10, 1947 and June 10, 1948; Grass Lake near Luther Pass, Eldorado Co., May 21, 1948; Carson Pass, Alpine Co., June 10, 1947; Winnemucca Lake, Alpine Co., 9500 feet, July 14, 1948; Silver Lake, Amador Co.,

June 10, 1947; Ebbett's Pass, Alpine Co., July 13, 1948; Sonora Pass, Tuolumne Co., 9500 feet, June 22, 1949.

AEDES CATAPHYLLA Dyar

The contrasting white and dark scales of the palpi in both sexes distinguish the adults of this species from those of *pullatus* which agree in having a long pale basal costal spot and a hypostigial spot of scales. Also, California *cataphylla* have the upright vertex scales of the female black or mixed black and pale, whereas in *pullatus* females these scales are golden.

The larvae of *cataphylla* are the only ones in California with pecten spines beyond the siphon tuft. The head hairs are commonly said to be single but this is not invariable. In 50 specimens collected in the Lake Tahoe region near the type locality, 6 of the upper head hairs are double, 1 is triple and 1 lower head hair is double. Thus, 93 percent of the upper head hairs are single and 99 per cent of the lower hairs are single. Similarly the statement is encountered in the literature that the pecten has 2 or 3 teeth beyond the pecten tuft (Matheson, 1944; Dyar, 1928), whereas the disposition of the pecten teeth is rather variable in my material. In 50 specimens, 11 have one or more detached teeth before the tuft and 5 have 4 or 5 detached teeth beyond the tuft. The total number of detached teeth varies from 2 to 5 with an average of 3.7. The comb is reported by Dyar (1928) to contain "about 15 scales." In my material the number varies from 10 to 21 with an average of 12.8 scales in 50 specimens.

The preferred larval breeding places seem to be in rather large ponds in the open meadows at altitudes from 6,000 to 9,500 feet. Adults bite in shade or at night. Personal larval records are: meadows south of Lake Tahoe, Eldorado Co., May 21, 1948; Meyers Meadows near Lake Tahoe, May 21, 1948; Hope Valley, Alpine Co., May 31, 1947 and May 21, 1948; Carson Pass, Alpine Co., June 10, 1947; Sonora Pass, Tuolumne Co., 9,700 feet, June 10, 1947.

AEDES PULLATUS (Coquillett)[1]

The only previous record of this species in California is that given by Howard, Dyar and Knab (1917), "Summit, Placer County, California, July 19, 1915 (H. G. Dyar)." Judging by

[1]Since this paper was submitted for publication, *Aedes pullatus* has been reported from Tuolumne Co., California, by P. T. Johnson and E. B. Thurman. See Pan-Pacific Ent. 26(3):107-110.

the date, the record was based on an adult female, and the identification was corrected to *A. communis tahoensis* in the appendix of the same volume. However, the species does occur in California as proven by my collection of larvae and reared adults of both sexes from Sonora Pass, Tuolumne and Mono Counties, about 9,500 feet, June 10, 1947. Larvae were taken from sunlit pools both in the large meadow west of the pass and a small meadow to the east. Associated larvae were *Aedes hexodontus, cataphylla* and *ventrovittis*. Attempts to find it in 1948 and 1949 were not successful. The adult female is the only one of the snow mosquitoes in California with the combination of a hypostigial patch of scales and all yellow upright scales on the vertex.

The larvae are similar to those of *communis* except for the more slender comb scales and the multiple head hairs. According to Dyar (1928) and Matheson (1944), the upper head hairs have 8 branches and the lower have about 4 branches. In my material from California, Colorado and Wyoming the upper head hairs rarely have as many as 8 branches. The California material, consisting of 15 specimens, have the upper head hairs with 5 to 8 branches, the average being 6.3, and only 1 of the 15 specimens has 1 hair on one side with 8 branches. The lower head hairs vary from 3 to 5 branches except 1 hair on one side with 8 branches, the average being 4.2 branches.

Aedes ventrovittis Dyar

At certain times and places this small, dark mosquito occurs in great numbers. I have seen it so abundant at Young's Lake, Tuolumne Co., 10,300 feet, that the swarms dimmed the sunlight and hikers were forced to run through the infested areas. In spite of the abundance of the females at elevations from 6,000 to 11,000 feet in the central Sierra, the larvae are rarely seen. In fact the only published records are those of Dyar (1921, 1924) in which he recorded the larvae in snow-water pools in a meadow at 7,000 feet near Summit, Placer Co., and at Lake Tahoe at 6,000 feet in a roadside ditch fed with water from a snow bank. The 4 localities in which I have found larvae were all over 8,500 feet. These were a meadow above Winnemucca Lake, Alpine Co., 9,200 feet, July 14, 1948; a meadow near Blue Lakes, Alpine Co., 8,600 feet, July 13, 1948; and meadows on either side of Sonora

Pass, Tuolumne Co., 9,500 feet, June 10, 1947. In each case the larvae were associated with a lesser number of *hexodontus* in small, open, shallow pools, the water in which was warm to the touch. A single male was collected at the Blue Lakes locality flying near the breeding site. At the summit of Ebbetts Pass, Alpine Co., 8,700 feet, July 13, 1948, I collected larvae of *Culiseta incidens* (Thomson) in large pools and *Aedes hexodontus* in small meadow pools. A few *ventrovittis* females were biting and males of the same species circled above my head in singing swarms of several hundred individuals. As many as 50 were taken in one swoop of the net. According to Dyar (1928) and Matheson (1944) the larval head hairs are single, the comb has 7 (Dyar) or 6 to 9 (Matheson) scales, and the last 2 pecten teeth are more widely spaced. An examination of 50 specimens from Winnemucca Lake, Alpine County, gives the following figures: The head hairs are occasionally split toward the apex and 1 out of 100 upper head hairs is double. The comb scales vary in number from 6 to 18, are usually 8 to 12, and average 9.7. The detached pecten teeth vary from 1 to 4 with average of 1.9.

AEDES IMPIGER (Walker)

I have not collected this species, the larvae of which are supposed to occur with *cataphylla* according to Dyar (1928).

AEDES CINEREUS HEMITELEUS Dyar

The use of the subspecific name for Californian specimens of this species is probably justified by their generally darker body color. The small size and almost or entirely continuous line of white along the side of the abdomen are distinguishing features of the adult. Also, the male palpi are very short. The larvae have multiple head hairs, the comb in a partly double row, the siphon tuft situated at the apical one-third of the siphon and preceded by 2 or 3 detached teeth. In 22 specimens from the central Sierra the number of comb scales ranges from 9 to 14, with an average of 12.0. I have found larvae in meadow pools shaded by willows, the water often containing brown algae. The adults were observed to bite in the sun, but timidly and only near the ground. Personal larval records are: Little Truckee River, Eldorado Co., May 30, 1947; Meyers, Eldorado Co., May 28, 1949; Hope Valley, Alpine Co., May 31, 1947.

LITERATURE CITED

DYAR, H. G.
1920. The American *Aedes* of the *stimulans* group. Ins. Ins. Mens. 8:106-120.
1928. The mosquitoes of the Americas. Carnegie Inst. Wash., Pub. no. 387, pp 1-616.

HOWARD, L. O., DYAR, H. G. and KNAB, F.
1917. The mosquitoes of North and Central America and the West Indies, 4:525-1064. Carnegie Inst. Wash., Pub. no. 159.

KNIGHT, K. L.
1948. A taxonomic treatment of the mosquitoes of Umiat, Alaska. Nav. Med. Res. Inst. Bethesda, Proj. NM005017, Rept. 2, pp. 1-12.

MATHESON, R.
1944. Handbook of the mosquitoes of North America. Comstock Pub. Co., Ithaca, pp. 1-314.

A NEW DISTRIBUTION RECORD FOR PLEOCOMA BEHRENSII

(Coleoptera: Scarabaeidae)

BY PETER S. GRIMES

While on a field trip to Tomales Bay, Marin County, California, in October, 1948, the writer found a female specimen of *Pleocoma behrensii* LeConte[1] which has proved to be the most northernly confirmed record for the species. Previously it had been found only in the region immediately surrounding San Francisco Bay.[2]

The writer was examining the Pleistocene and Recent sediments in this area for fossils when the specimen was found about 15 feet below the top of the bank on the east shore of Tomales Bay, approximately 4 miles north of Point Reyes Station and nearly opposite the town of Inverness on the west shore of the Bay. The abdomen of the beetle was protruding from the bank out of a cavity which had apparently been exposed by wave action and recent rains. The bank was well rooted. The specimen was apparently dead when found.

[1]Determination by E. G. Linsley.
[2]Linsley, E. G., 1938, Pan-Pacific Ent. 74 (2):56; (3):108.

OVIPOSITION AND BEHAVIOR OF *LIRIOMYZA PUSILLA* (MEIGEN)

(Diptera: Agromyzidae)

BY J. W. TILDEN

San Jose State College, San Jose, California

Among the normal fauna of *Baccharis pilularis* D. C. is a leaf-mining agromyzid that produces blotch mines. Mr. C. T. Greene was so kind as to identify the fly as *Liriomyza pusilla* (Meigen). A difference of opinion exists as to the identity of *pusilla*, inasmuch as A. E. Pritchard (personal communication) has pointed out that certain records in the literature refer to *pusilla* as a serpentine miner, while K. E. Frick (personal communication) states that certain European writers apparently limit the name *pusilla* to a blotch miner of euphorbia. It is clear that there is some confusion in the literature on this matter.

The mines of this fly may be found on *Baccharis* from March through June, but activity declines rapidly with the onset of dry weather and the attendant slowing up or cessation of growth. The larvae reappear in the fall after the rains begin. In general, the activity of the larvæ coincides with the period of growth of the plant.

It has been noted, as for instance by Needham, Frost and Tothill (Leaf-mining Insects, 1928, pp. 231-278) that leaf-mining Diptera are often far from host specific, and it is very probable that *Baccharis pilularis* is not the only host of *L. pusilla*. However, no other species was reared from *Baccharis*, so it appears that in the Peninsula district of the San Francisco Bay region, this is the usual agromyzid leaf-miner of *Baccharis*. The damage done is negligible, the percentage of infested leaves per plant being small.

Freshly emerged adults were confined over a branch of *Baccharis pilularis* subspecies *consanguinea* D. C. on March 24. On the afternoon of the same day, the female was observed running rapidly over the leaves, pausing at times to stroke the surface with the labella. After considerable examination, a spot was selected and the ovipositor inserted into the leaf. Peristalsis of the abdomen followed, and to all appearances oviposition was taking place. After each puncture had been completed, the female re-

treated a few steps and smoothed the puncture with the labella, also feeding on the exudate. This caused the punctures to be very inconspicuous. The entire process was repeated many times, but it became increasingly apparent that no eggs were being deposited. After several days of this behavior, the female was removed and the leaves minutely examined, and as suspected, no eggs had been laid in any of the punctures.

Concurrent with this experiment, a feral female taken on April 25 was similarly confined over a branch of the plant. The same behavior, consisting of inspection, puncture, and feeding on the puncture, was observed in this field-taken female, but it was easily evident that an egg was being laid in each puncture. On April 28 the leaves were examined and many eggs were found.

The egg is oval, somewhat pointed at each end, and inserted into the tissue of the leaf just below the epidermis and parallel to the leaf surface, not vertical to it. The egg lies about its own length from the entrance to the puncture and at a magnification of 30x is easily visible as a swelling below the epidermis. Fifty-seven eggs were found quite evenly distributed over the surface of seven large leaves, and were about equally numerous on both upper and lower surfaces. Only large leaves were used for oviposition. Numerous other punctures did not contain eggs.

The eggs increased in size after oviposition, and it is believed that this is due to imbibition of fluids from the plant tissues. Certain of them increased to fully twice the dimensions of freshly laid eggs. Some necrosis of the plant tissue resulted from the insertion of the ovipositor, but in every case this was slight. The hatching of the eggs was unfortunately not seen since no method was devised to prevent the leaves from wilting in the laboratory.

However, several field-collected larvae were reared. It was found that they fed as do certain other leaf-mining diptera, (such as Anthomyiidae), moving the anterior end of the body in a lateral horizontal plane, from side to side. This was accompanied by scraping movements by the mouth hooks, the mesophyll of the leaf being removed and ingested. The mines were linear and inconspicuous at first, but became blotchy later, and eventually involved most of the leaf surface. Although eggs were laid on both upper and lower surfaces of leaves, there was no differentiation into upper and lower surface mines, all becoming similar in appearance as the larvae matured.

The larvae are able to leave one leaf and to enter another. This is done when the larva reaches the end of a leaf, even when material remains uneaten in other parts. It cuts a crescent-shaped slit in the epidermis and squeezes out. It then crawls across the leaf-surface by alternately elongating and telescoping the body. The anterior end of the body is advanced and a hold obtained with the mouth hooks. Then the posterior part of the body is advanced by contracting the intersegmental membranes. The anal disc is also used in pushing forward. To enter a leaf, the larva cuts a small gash in the epidermis and begins to feed in the usual manner, gradually working its way in. The surface of the body is moist and viscid and it leaves a track of slimy deposit.

At maturity, the larva exits from the leaf by a crescent-shaped opening and wanders around for some time, as much as several hours. Most of the larvae that were observed entered soil to pupate, but some individuals pupated on leaves, stems, or on the sides of rearing vials. The puparium is yellowish-brown, with the segmentation of the larval skin distinctly visible. There are two prominent dorsal projections and two much less well marked lateral posterior projections. These are the tubes mentioned in descriptions. The puparia average 2.0 mm. in length.

The reason for lack of success in obtaining eggs from females reared in the laboratory is not entirely understood, but it is assumed to be due to a lack of certain essential foods that are available to females under field conditions. The situation may be similar to that existing in *Callophora,* as cited by Brues (Insect Dietary, 1946, pp. 59-60), in which certain protein foods must be available to the female, and in which, moreover, a certain length of time is required for the eggs to mature.

Two species of hymenopterous parasites were reared, both emerging from the puparia. One was a species of *Opius,* a member of a genus known to parasitize Agromyzidae. The other was a species of *Melanips* (Figitinae) of a group, the members of which are frequently hyper-parasites. It is likely that *Melanips* is secondary on *Liriomyza* through some primary parasite.

I am indebted to Dr. C. F. W. Muesebeck for the determination of the *Opius* species, to Dr. L. H. Weld for the determination of the *Melanips* species, and to Mr. C. T. Greene for examining some of the adult flies. Thanks are due also to Dr. A. Earl Pritchard and to Mr. Kenneth E. Frick for their helpful suggestions.

SYSTEMATIC NOTES ON THE GENUS FORMICILLA IN THE UNITED STATES AND MEXICO

(Coleoptera: Anthicidae)

BY R. S. BEAL, JR.

University of California, Berkeley

Present definitions of species of *Formicilla* seem to be drawn largely from characters of little taxonomic significance or from features which are generic in nature rather than specific. The genus itself has been defined on the basis of but a few of its real taxonomic characters and hence has been erroneously separated from that group of genera now classified as *Anthicus*, within whose phylogenetic limits it more properly lies. However, since Casey's genera seem for the most part to be valid on the basis of numerous, clear, morphological differences throughout the whole range of American Anthicids, it seems best to retain *Formicilla* for the present as a distinct genus. Unfortunately the South American species have not been available for this study, but it is hoped that this paper will simplify the task of assigning them to their correct systematic position.

The writer is especially indebted to E. G. Linsley for his helpful suggestions and criticisms in connection with this paper. For the loan of material from their own collections or from those in their care particular thanks are expressed to E. S. Ross and Hugh B. Leech of the California Academy of Sciences, E. A. Chapin of the United States National Museum, Frank H. Parker, K. S. Hagen, and A. T. McClay.

Genus FORMICILLA LeConte

Formicilla LeConte, 1851, Ann. Lyc. Nat. Hist. New York, 5:152; Casey, 1895, Ann. New York Acad. Sci., 8:644; Pic, 1911, Junk Coleopt. Cat., pars 36, p. 22.

Anthicus LeConte, 1852, Proc. Acad. Nat. Sci. Phila., 6:94 (not *Anthicus* Paykull, 1798).

Formicus LeConte, 1861, Class. of Coleopt. Part I, Smithson. Misc. Col., 3:266.

Formicomus LeConte and Horn, 1883, Class. of Coleopt., p. 412 (not *Formicomus* LaFerte, 1848); Champion, 1890, Biol. Centr.-Amer., 4(2):220; Fall, 1901, Occas. Papers Calif. Acad. Sci., 8:180-1.

Pubescence of dorsal surfaces variable, punctation setiferous, fine, and remote; ventral surfaces and legs covered with light recumbent to sub-recumbent pubescence, punctation minute and remote. *Head* convex, unimpressed at base; antennae gradually incrassate, eleventh segment entire and conoidal; ultimate palpal joint securiform. *Pronotum* elongate, strongly constricted at about basal third, constriction not extending across dorsal surface; collar narrow but deeply constricted; basal margin distinct. *Elytra* more or less convex with slight posthumeral depression or flattening; maculation consisting of median, apical, and sometimes humeral dark areas; intervening light areas transparent with variable, opaque reticulation; vannal veins of hind wings two, simple and unbranched. *Anterior coxal cavities* partially but not entirely closed by inward prolongation of lateral lobes behind coxae. Mesosternum extended laterad in broad, flat, laterally rounded, shining plate, wider than base of pronotum and visible from above in humeral angle, anterior margin subtransverse, lateral setae long, curving upward, inserted singly (not in pairs). Mesepisternum widely joined at midventral line, not visible from above and not visible between lateral margin of mesosternum and base of elytron. Medio-anterior margin of metasternum evenly concave and not produced between coxal cavities. *Legs* long and slender, profemora only moderately clavate, tibial spurs present, penultimate segment of metatarsus variable. Sixth abdominal sternite of male with narrow median cleft to base, inner margins of cleft slightly bilobed, tip of apical lobe bent slightly downward. Median lobe of aedeagus long and slender, evenly tapering to apex, without lateral parameres. Apical expansion of spicule triangular and bearing on either side a thin, sclerotized appendage. Last abdominal tergite apically rounded and not thickened, not reflexed internally, nor otherwise modified.

Genotype—*Formicilla munda* LeConte (monobasic).

Formicilla is readily separable from other neartic genera on the basis of pronotal, sternal, and genital characters as well as by its vestiture and general shining appearance. The narrow cleft of the sixth abdominal sternite is unlike that of any North American Anthicid I have seen, while the mesosternum with a dilation so broad that the mesepisternum is not visible between its lateral edges and the bases of the elytra separates it from all genera except *Dilandius*. However, the latter is distinct through differences in the median lobe and sixth abdominal sternite, in the shape of the pronotum in which the constriction extends across the dorsal surface, and in the peculiar shape of the head. In describing the procoxal cavities of *Formicilla* I have found it necessary to disagree with Casey, who stated that they were closed; in

Dilandius they are unmistakably closed, but only partially so in *Formicilla.*

The determination of species limits is made difficult by apparent gaps in the geographical record, gaps which are possibly not real but conceivably the result of a failure to collect these minute beetles. It is certainly true that there are two distinct complexes in the genus, that of *scitula* in the south-eastern United States and Texas, and that of *munda* with its allied forms extending from the San Joaquin Valley of California into Mexico and Central America. Specific characters are to be found in the vestiture, in the form of the elytra, in the shape of the penultimate metatarsal segment, in elytral coloration and maculation—though these are subject to considerable variation—and in a comparison of the width of the head with that of the anterior pronotal lobe. Careful comparative measurements of the lengths of the last three antennal segments show small mean differences, but the extremes overlap, at least in the species considered here, and hence the comparisons of these made by Casey do not have diagnostic value. The same thing has been found true of comparative measurements of the length and width of the pronotum, and of the length and width of the elytra.

Key to the Species of Formicilla in the United States and Mexico

1. Elytra with fine, sparse, subrecumbent hairs and usually long setae; penultimate metatarsal segment much longer than wide, barely emarginate apically, ultimate segment inserted near apex; anterior lobe of pronotum round; ratio of width of head to width of pronotum very nearly equal.....2

– Elytra with long setae but without subrecumbent hairs; penultimate metatarsal segment short and bilobed, ultimate segment inserted before the middle; anterior lobe of pronotum obovate; ratio of width of head to width of pronotum closely approximating 1:0.9 4

2. Ground color of elytra definitely lighter than color of pronotum and head; median band wide, faintly interrupted or confluent at suture; posterior band enveloping apex; Arizona and Sinaloa, Mexico .....*gilensis*

– Ground color of elytra same as color of pronotum and head; median band wide to narrow, interrupted widely to narrowly at suture; posterior band only occasionally enveloping apex....3

3. Humeri of elytra not or faintly marked with dark, apex of elytra never entirely enveloped by posterior fasciae; California and Arizona ..... *munda munda*

– Humeri of elytra occasionally strongly marked with dark, apex of elytra occasionally enveloped by posterior fasciae, fasciae occasionally extremely reduced; Southern Mexico to Guatemala ..... *munda gracilipes*

4. Median fasciae separated by space equal to half width of elytron; posterior band narrower than space between it and apex; islands off coast of So. Carolina and Georgia..... *scitula scitula*

– Median fasciae contiguous or separated by space equal to less than half width of elytron; posterior band wide, as wide or wider than space between it and apex or enveloping apex, sometimes confluent with median band; Georgia mainland to Texas ..... *scitula evanescens*

FORMICILLA GILENSIS Casey

Formicilla gilensis Casey, 1895, Ann. New York Acad. Sci., 8:647-8; Pic, 1911, Junk Coleopt. Cat., pars 36, p. 22.

Polished, head and body light to dark piceous, dorsal surface sparsely set with fine, short, subrecumbent hairs and usually with sparse, long, erect setae, but latter rarely limited to head. *Head* subquadrate behind eyes, temporal angles rounded; width behind eyes closely approximating width of anterior lobe of pronotum. *Pronotum* with obovate anterior lobe; ratio of pronotal width to length ranging from 1:1.37 to 1:1.57. *Elytra* ochreous; maculation of humeri dark brown to black, reduced to small spots or expanded into wide band contiguous at suture; median band brown to black, contiguous or faintly interrupted at suture; apical band wide, brown to black, enveloping apex; ochreous bar intervening between median and apical bands narrow, and V-shaped, transverse, or nearly obsolete; sides subparallel, widest near middle; profile not raised above level of pronotum, slightly convex, visibly impressed behind humeri; humeral angles prominent and evenly rounding; ratio of width to length ranging from 1:1.4 to 1:1.9. *Undersurface of thorax* piceous; posterior margin of anterior coxal floor not produced behind in acute cusp but rather slightly angulate and not projecting beyond middle of lateral lobes. Penultimate metatarsal segment narrow, not lobed, barely emarginate at apex, ultimate segment inserted near apex. *Abdomen* slightly to much darker than thorax, dark piceous to black. *Length* of male: 2.2 mm. to 2.5 mm.; width: 0.6 mm. to 0.8 mm.; length of female: 2.3 mm. to 2.8 mm.; width: 0.6 mm. to 0.8 mm.

Type locality—Tucson, Arizona. No other recorded distribution.

New records—Sedona, Arizona, May 19, 1947 (Edwin Potts); Phoenix, Arizona, May 8, 1947 (R. S. Beal); Willcox, Arizona, February 2, 1934 (Bryant); Nogales, Arizona, August 12, 1906 (specimen in Cal. Acad. Sci. collection); Robles Ranch, Pima Co., Arizona, August 17, 1947 (A. T. McClay); Los Mochis, Sinaloa, Mexico, July 20, 1922 (C. T. Dodds).

Though sympatric with *munda* and differing from it in few morphological characters, the large series I have examined never seem to intergrade with it. I have taken specimens running about on damp ground near streams and flying to lights. One adult specimen was collected under the bark of a decaying cottonwood at Tucson in the early part of March.

Formicilla munda LeConte

Polished, ochraceous-buff to light piceous, dorsal surface sparsely set with fine, short, subrecumbent hairs and usually with long, erect setae. *Head* subquadrate behind eyes, temporal angles rounded; width behind eyes closely approximating width of anterior lobe of pronotum. *Pronotum* with obovate anterior lobe; ratio of pronotal width to length ranging from 1:1.25 to 1:1.51. *Elytra* with same ground color as head and pronotum; humeral maculae present or absent; fasciae at middle interrupted widely to narrowly at suture, occasionally much reduced; posterior fasciae wide, joined at suture, enveloping apex or not; sides subparallel, widest near middle; profile not raised above level of pronotum, slightly convex, visibly impressed behind humeri; humeral angles prominent and evenly rounding; ratio of width to length ranging from 1:1.3 to 1:1.7. *Undersurface of thorax* ochraceous-buff to light piceous; posterior margin of anterior coxal floor not produced behind in acute cusp but rather slightly angulate and not projecting beyond middle of lateral lobes. Penultimate metatarsal segment narrow, not lobed, barely emarginate at apex, ultimate segment inserted near apex. *Abdomen* identical in color to rest of undersurface. *Length* of male: 2.2 mm. to 2.5 mm.; width: 0.7 mm. to 0.8 mm.; length of female: 2.3 mm. to 2.7 mm.; width: 0.8 mm to 0.9 mm.

Formicilla munda munda LeConte

Formicilla munda LeConte, 1851, Ann. Lyc. Nat. Hist. New York, 5:152; Casey, 1895, Ann. New York Acad. Sci., 8:646; Pic, 1911, Junk Coleopt. Cat., pars 36, p. 22.

Anthicus munda LeConte, 1852, Proc. Acad. Nat. Sci. Phila., 6:94.
Formicus munda LeConte, 1861, Class. of Coleopt., Part I, Smithson. Misc. Col., 3:266.

Formicomus munda (LeConte), Champion, 1890, Biol. Centr.-Amer., 4(2):220; Fall, 1901, Occas. Papers Calif. Acad. Sci., 8:181.

Humeri of elytra not or faintly marked with black; fasciae at middle extending to or but narrowly interrupted at suture; posterior fasciae variable, but never entirely covering apex at suture.

Type locality—Yuma, California. No other recorded distribution.

New records—Visalia, California, September 10, 1944 (L. R. Gillogly); 4 miles south of Dos Palos, Merced Co., California, September 7, 1946 (K. S. Hagen); Ehrenberg, Arizona, July, 1938 (F. H. Parker); Blythe, California, July 8 to August 24, 1947 (J. W. MacSwain); Globe, Arizona, August 3, 1935 (F. H. Parker). I have examined one specimen now in the collection of Mr. K. S. Hagen labeled simply "Tex.", but its validity may well be questioned until verified by subsequent collections in that state.

The coloration and vestiture of this subspecies is somewhat variable, occasional forms lacking the long tactile setae on both the elytra and pronotum, although never the short recumbent hairs. In this respect it varies in a different direction than the following subspecies, which apparently always possesses the setae, but which varies to a greater degree in the extent of its elytral maculation, which may be quite reduced or much heavier.

FORMICILLA MUNDA GRACILIPES (Champion), *new status*

Formicomus gracilipes Champion, 1890, Biol. Centr.-Amer., 4(2): 220, and plate x, fig. 1.

Formicilla gracilipes (Champion), Pic, 1911, Junk Coleopt. Cat., pars 36, p. 22.

Humeri of elytra strongly marked with black or not, apex of elytra enveloped by posterior fasciae or not; fasciae occasionally extremely reduced or median fasciae expanded and confluent at suture.

Type locality—Not recorded.

Recorded distribution—Cordova, Mexico; Vera Cruz, Mexico; Champerico, Guatemala; Paso Antonio, Guatemala.

New record—5 miles south of Cuernevaca, Mexico, Nov. 19, 1946 (E. S. Ross).

The information concerning the extremes of variation in this subspecies has been drawn from Champion's description and records in the *Biologia Centrali-Americana*. The two specimens I have examined differ so far as I can tell in no significant detail

from *munda munda*, but the apparent geographic isolation of the two forms and the seemingly different ranges of genetic variability of each serve to justify the subspecific categories.

Formicilla scitula (LeConte)

Highly polished, pale rufo-testaceous, dorsal surface sparsely set with long, erect, tactile setae. *Head* just discernably less pale than body, oval, temporal angles broadly rounded and indefinitely defined; ratio of width of head measured just behind eyes to width of pronotum closely approximating 1:0.9. *Pronotum* with anterior lobe rounding and widest about middle; ratio of width to length ranging from 1:1.37 to 1:1.66. Elytra of same ground color as pronotum; setae always present, fine recumbent hairs lacking; humeri with or without dark marking; brown to black fasciae just before middle not at all or widely interrupted at suture, extending to or widely removed from apex; sides rounding, widest near middle; profile convex, slightly raised above level of pronotum, slightly flattened behind humeri; humeri obtuse and sharply rounding; ratio of width to length ranging from 1:1.4 to 1:1.7. *Undersurface of thorax* light piceous; posterior margin of anterior coxal floor produced behind in acute cusp projecting to edge or beyond edge of lateral lobes. Penultimate metatarsal segment short and bilobed with ultimate segment inserted before middle. *Abdomen* identical in color to rest of undersurface. *Length* of male: 2.1 mm. to 2.7 mm.; width: 0.7 mm. to 0.9 mm.; length of female: 2.1 mm. to 2.7 mm.; width: 0.8 mm. to 1.0 mm.

Formicilla scitula scitula (LeConte)

Anthicus scitula LeConte, 1852, Proc. Acad. Nat. Sci. Phila., 6:94.
Formicus scitula LeConte, 1861, Class. Coleopt., Part I, Smithson. Misc. Col., 3:266.
Formicilla scitula (LeConte), Pic, 1911, Junk Coleopt. Cat., pars 36, p. 22.

Humeri without maculation; median fasciae separated by space equal to half width of elytron; posterior band narrower than space between it and apex, barely interrupted at suture.

Type locality—South Carolina. No other recorded distribution.

New records—St. Simons Island, Georgia, July 12, 1931 (C. A. Frost); Tybee Island, Georgia, June 20 (H. W. Wenzel).

Formicilla scitula evanescens Casey, *new status*

Formicilla evanescens Casey, 1895, Ann. New York Acad. Sci., 8:646; Pic, 1911, Junk Coleopt. Cat., pars 36, p. 22.
Formicilla scitula, Casey (nec LeConte), 1895, Ann. New York Acad. Sci., 8:644.

Humeri with or without dark markings; median fasciae contiguous at suture or separated by space equal to less than half

width of elytron; posterior band wide, as wide or wider than space between it and apex and often enveloping apex, interrupted at suture or not, sometimes confluent with median band.

Type locality—Austin, Texas.

Recorded distribution—Sebastian River, Florida.

New records—Brownsville, Texas, Sept., 1942 (E. S. Ross); Del Rio, Texas, July 23, 1924 (Wickham); Fedor, Texas (Birkman); Houston, Texas (Wickham); Corpus Christi, Texas, Oct. 20, 1905, April 13, 1906 (F. C. Pratt); Columbus, Texas, (Hubbard and Schwarz); Hidalgo, Texas, Sept. 2, 1940 (B. C. House); Roxie, Miss., Sept. 16, 1908 (W. D. Pierce); Maudeville, La., (H. Soltau); Shreveport, La., Sept. 14, 1908 (E. S. Tucker) and April 13, 1937 (Anderson); Peach Co., Ga., Nov. 19, 1937 (Turner); Jasper Co., Ga., July 25, 1936; Experiment, Ga., Nov. 10, 1935 (T. L. Bissell); Capron, Florida (Hubbard and Schwarz).

In his redescription of *scitula* Casey evidently had before him specimens from Florida only, which, although tending to be somewhat lighter in color than the Texas form, are closer to it than to the form originally described by LeConte from South Carolina. Perhaps other subspecies of *scitula* should be recognized than those here described, but present collections are not extensive enough to afford their determination.

SPECIES DESCRIBED BUT UNRECOGNIZED

Formicilla punctata Pic, 1904, Ann. Mus. Zool. St. Petersb., 9:491; Pic, 1911, Junk Coleopt. Cat., pars 36, p. 22.

I feel reasonably certain that *punctata*, said to be distinguished by large serial punctures of the elytra, especially on the disc, will prove, upon examination of the type, to be a synonym of one of our described species. The locality given by Pic is "Etats-Unis: Obisop (ex Motschulsky)." Since good diagnostic characters are not mentioned in the description, its systematic position must remain in doubt.

BIBLIOGRAPHY

BLACKWELDER, R. E.
1945. Checklist of the coleopterous insects of Mexico, Central America, the West Indies, and South America, Part 3. Smithson. Inst., U.S.N.M. Bul. 185, pp. 432-435.

CASEY, THOMAS L.
1895. Coleopterological Notices VI, "Anthicidae." Ann. New York Acad. Sci., 8:624-809.

CHAMPION, GEORGE C.
1890. Fam. Anthicidae. *In*: Biologia Centrali-Americana. Insecta, Coleoptera, Heteromera (Part), 4(2):190-250 and plates 9-10.

FALL, H. C.
1901. List of the Coleoptera of Southern California. Occ. Papers of the Calif. Acad. Sci., 8:1-282.

LECONTE, JOHN L.
1851. Descriptions of new species of Coleoptera from California. Ann. Lyc. Nat. Hist. New York, 5:125-216.
1852. Syn. of the Anthicites of the United States. Proc. Acad. Nat. Sci., Phila. 6:91-104.
1861. Classification of Coleoptera, Part I, Smithson. Misc. Col., 3:1-285.

LECONTE, JOHN L. and HORN, GEORGE H.
1883. Classification of the Coleoptera of North America. Smithson. Misc. Col., 26(507):xxxviii+1-568.

PIC, MAURICE
1904. Notes sur diverses espéces d'Anthicides. Annuaire du Musée Zoologique de l'Acad. Imp. St. Petersb., 9:490-494.
1911. Anthicidae. *In* Junk, Schenkling, Coleopterorum Catalogus, Berlin. pars 36, pp. 1-102.

A NEW NITELA FROM CALIFORNIA

(Hymenoptera, Sphecidae)

BY KARL V. KROMBEIN

Arlington, Virginia

The present species, the first known from the United States from west of the Mississippi River, is described at this time so that the name will be available for inclusion in the forthcoming synoptic catalog of North American Hymenoptera.

Nitela townesorum[1] Krombein, new species

Female. Body length 4.3 mm., forewing 3.1 mm. Mandible except base, tegula, trochanters and tarsi, ferruginous; palpi and tibial spurs testaceous. Pubescence inconspicuous, short, pale and sparse. Wings hyaline, stigma dark brown, venation lighter brown.

Head opaque, the front with numerous small punctures, the interspaces finely lineolate, temples finely lineolate; clypeal lobe obliquely angulate laterally; median carina of clypeus low, termi-

[1] I take pleasure in naming this species for its collectors, Henry, Marjorie, George, David and Jean Townes.

nating apically in a polished, impunctate triangular bevel and basally at the base of clypeus; front not at all gibbous in lateral view, the frontal carina evanescent, its location indicated by a short polished streak; interocular distance at upper level of antennal scrobes 1.86 the shortest interocular distance on vertex; distance between inner margins of antennal scrobes 1.5 the distance between outer margin of antennal scrobe and lower inner angle of compound eye; postocellar distance 2.5 the ocellocular distance; eyes with very fine hairs; length of malar space 0.5 the distance between outer margin of antennal scrobe and lower inner angle of compound eye.

Thorax subopaque dorsally, subopaque to shining laterally, the propodeum shining; pronotum with fine transverse rugulae, without a transverse carina, posteriorly with a shallow ill-defined sulcus which is not foveolate; mesonotum punctured similarly to front, the lateral and posterior margins weakly foveolate; anterior margin of scutellum foveolate; mesopleuron sculptured similarly to *cerasicola;* dorsum of propodeum regularly reticulate, the mesh finer than in *cerasicola.*

Forewing with recurrent and transverse cubital veins interstitial, submarginal cell rectangular.

Abdomen shining, with very sparse, fine scattered punctures.

Male. Unknown.

Type: ♀; near GLACIER POINT, YOSEMITE PARK, CALIFORNIA, July 17, 1948 (H., M., G., D. and J. Townes) [Townes Collection].

Paratypes: 2♀♀; same data but July 16, 1948 [Townes and Krombein Collections]. The paratypes agree in all essential details with the above description of the type.

N. townesorum is immediately distinguished from the other Nearctic species by having the recurrent and transverse cubital veins interstitial. It agrees with *cerasicola* Pate and *floridana* Pate, and differs from *virginiana* Rohwer, in having hairy eyes and a rectangular submarginal cell, and in the lack of a strong transverse carina on the pronotum and an antero-lateral foveolate area on the mesonotum. It differs further from *floridana* and *cerasicola* in that the front is not at all protuberant, from *cerasicola* in lacking the deep posterior sulcus on the pronotum and the well-developed frontal carina, and from *floridana* in the less strongly converging compound eyes (interocular distance at antennal scrobes 2.14 the shortest interocular distance on vertex in *floridana*), the foveolate anterior margin of the scutellum and the longer malar space (length of malar space in *floridana* one-third the distance between outer margin of antennal scrobe and lower inner angle of compound eye).

NOMENCLATORIAL NOTES ON THE GENUS PEPSIS

(Hymenoptera: Pompilidae)

BY PAUL D. HURD, JR.

University of California, Berkeley

During a recent study of the names applied to the genus *Pepsis* Fabricius, 1805 (1804):207, several instances of names requiring nomenclatorial changes were detected. In order to facilitate the citation of these names in a forthcoming paper this opportunity is taken to effect the necessary changes.

Included herein are three cases involving primary homonymy, one of secondary coexistent homonymy, and one of species misinterpretation.

Pepsis accipitrinus Hurd, *nom. nov.*

Pepsis accipitrinus Hurd, *nomen novum pro Pepsis fuscipennis* Smith, 1873:50, ♀, *nec Pepsis fuscipennis* Fabricius, 1805 (1804):210.

Pepsis atricoma Hurd, *nom. nov.*

Pepsis atricoma Hurd, *nomen novum pro Pepsis fusca* Lucas, 1895:788, ♀, plate 33, figure 181, *nec Pepsis fusca* (Christ), 1791:256.

On page 788 of his monograph Lucas described a "variety" of *nessus* Lucas, 1895:787, as *fusca* and indicated by reference to page 711 and also on page 811 its affinities with *Pepsis guatemalensis* Cameron, 1893:216. Brèthes, 1914:255, in his "Tableau Dichotomique des Pepsis" has accorded *fusca* of Lucas full specific rank which places it in homonymy with *Pepsis fusca* (Christ), 1791:256 which has been shown to be a member of the genus *Pepsis* by Kohl [*in litt.*] to Dalla Torre, 1897:254.

Pepsis linsleyi Hurd, *nom. nov.*

Pepsis linsleyi Hurd, *nomen novum pro Pepsis bonariensis* Lucas, 1895:754, 755, 760-762, ♂ ♀, plate 31, figure 81, plate 32, figure 112, plate 33, figures 205, 215, *nec Pepsis bonariensis* Lepeletier, 1845:476, ♀.

Lucas, under the impression that he had the Lepeletier species, treated a species from Costa Rica and Mexico (Orizaba) as

Pepsis bonariensis Lepeletier. However, Brèthes, 1914:322-333, 356, has shown that *Pepsis bonariensis* Lepeletier [from "Buenos-Ayres"] is not a member of the genus *Pepsis*, and is referred by him to the genus *Salius*. Therefore *Pepsis bonariensis* of Lucas is left without a name and is named *Pepsis linsleyi* in honor of Professor E. Gorton Linsley of the University of California who has been of invaluable assistance in the writer's studies on the genus *Pepsis*.

Pepsis palliata Hurd, *nom. nov*

Pepsis palliata Hurd, *nomen novum pro Pepsis obscura* Lepeletier, 1845:490, ♂ ♀, *nec Pepsis obscura Fabricius*, 1805 (1804):213.

Pepsis somatochlora Hurd, *nom. nov.*

Pepsis somatochlora Hurd, *nomen novum pro Pepsis apicalis* Lepeletier, 1845:472, ♀, *nec Pepsis apicalis* Gray, 1832:516. ♂.

LITERATURE CITED

BRETHES, JEAN
1914. Contribution à l'etude des Pepsis. Ann. Mus. Nac. Hist. Nat. Buenos Aires, 26:235-360, plates IX-XI.

CAMERON, PETER
1888-1900. Biologia Centrali-Americana. Insecta. Hymen (Fossores), 2:215-222, plate 12. (*Pepsis*).

CHRIST, J. L.
1791. Naturgeschichte, klassification und nomenclatur der insekten vom Bienen-, Wespen-, und Ameisengeschlecht. Frankfurt am Main. p. 256.

DALLA TORRE, C. G. DE
1897. Catalogus Hymenopterorum, 8:246-265. (*Pepsis*).

FABRICIUS, J. CHR.
1805(1804). Systema Piezatorum, Brunsvigae, pp. 207-216. (*Pepsis*).

GRAY, G. R. [*in* Cuvier, Le Baron]
1832. The animal kingdom arranged in conformity with its organization, the class Insecta arranged by Baron Cuvier with supplementary additions to each order [by Edward Griffith and others]. London. vol. 15, Insecta, 2:796pp.

LEPELETIER DE SAINT-FARGEAU, M. LE COMPTE AMEDEE
1845. Histoire naturelle des insectes. Hyménoptères. Suite à Buffon. 3:470-492. (*Pepsis*).

LUCAS, ROBERT
1895. Die Pompiliden-Gattung Pepsis. Berlin. entom. Zeitschr., 39:449-831, 1 frontispiece, plates XXII-XXXIII.

SMITH, FREDERICK
1873. Descriptions of new species of fossorial Hymenoptera in the collection of the British Museum. Ann. Mag. Nat. Hist., ser. 4, 12:49-59.

TWO NEW ORIENTAL PRIONIDS OF THE GENUS MEGOPIS

(Coleoptera: Cerambycidae)

BY J. LINSLEY GRESSITT

Lingnan Natural History Survey and Museum
Lingnan University, Canton, China

The following descriptions are based on material from the Museum of Comparative Zoology at Harvard University and specimens sent to me by P. S. Nathan from South India. The type material is deposited in the above institution, as well as the California Academy of Sciences, the Lingnan Natural History Museum and the Forest Research Institute of Dehra Dun, U. P., India. I am indebted to Dr. P. J. Darlington for the loan of material.

Megopis (Aegosoma) mediocostata Gressitt, new species

Male: Dark reddish brown, darker on head and prothorax; pitchy black on costae, margins, sutures, parts of mandibles and apices of antennal segments; more reddish on abdomen and distinctly reddish on femora. Body very sparsely and briefly clothed with adpressed tawny hairs, somewhat longer on mesepimera and adjacent areas; first four antennal segments with fairly short curved oblique tawny hairs of subequal length on all sides; only a few scattered hairs on following segments.

Head more than one-half again as long as prothorax and broader than anterior margin of latter; irregularly granulose, more coarsely so on antennal tubercles, with a median darkened narrow smooth line; frontoclypeus impressed; eyes slightly closer above than antennal insertions, well separated from genal margins; genae finely punctured; mandibles each sharply notched beyond middle of external margin, nearly forming an accessory tooth. Antennae slightly longer than body; scape stout, densely rugose-punctate; third segment slightly arched, slender, densely granulose, a little longer than next three segments combined; fourth granulose, finely punctured at apex, as long as next two combined; fifth to last finely punctured, flattened and carinate externally. Prothorax nearly twice as broad as long (including tubercles), irregularly granulose, emarginate at middle of apex; each side with an acute tubercle at middle and with lateral margin distinct

posteriorly, though without a prominent basal angle, and obsolete anteriorly; disc concave in center and with three swellings at each side, arranged obliquely. Scutellum short and subrounded. Elytra distinctly narrowed posteriorly, finely granulose, minutely so posteriorly, subrounded apically; disc of each with two shiny raised costae; first extending only for a basal quarter, second extending from near end of basal fifth to a short distance from apex, ending suddenly, strongly raised except near its basal end. Thoracic sterna minutely granulose; abdomen micropunctulate; last abdominal sternite slightly emarginate apically. Legs long and slender; femora nearly parallel-sided, fully two-thirds as long as abdomen; last tarsal segment about as long as first three combined. Length 34 mm.; breadth 8.7 mm.

Female: Antennae flattened from apex of fourth segment, subglabrous, nine-tenths as long as body; elytra broad at humeri and strongly narrowed. Length 49.4 mm.; breadth 13.8 mm.

Holotype, male (in Calif. Acad. Sci.), ANAIMALAI HILLS, at 1300 meters, S. MADRAS, S. INDIA, June 28, 1946, P. S. Nathan; *allotopotype*, female (in Forest Research Institute), and *paratype* (in Lingnan N. H. Mus.), same data.

Differs from *M.* (*Aegosoma*) *cingalensis* (White) in being larger, less parallel-sided, darker, with the prothorax much less hairy, more tuberculate at middle of each side and less tuberculate at basal angles and more finely and densely granulose, and the elytra impunctate, densely granulose and with much abbreviated first costa and very strongly raised second costa.

Megopis (Aegolipton) piliventris Gressitt, new species

Male: Ochraceous; head and prothorax darker, pitchy; elytra testaceous except for ochraceous bases, costae and sutural margins and blackish outer margins; antennae pitchy basally, becoming reddish from apex of third segment; legs slightly reddish ochraceous. Body clothed with fine erect pale golden tawny hairs except for glabrous elytra.

Head one-half again as long as, and distinctly narrower than, prothorax, distinctly granulose, sparsely or irregularly punctured behind eyes and on genae, subrugose beneath, with a fine smooth median line on dorsum; frons and vertex each transversely rounded -concave; clypeus emarginate apically, making labrum subelliptical; eyes distinctly closer above than antennal insertions, widely separated from genal margins, distant beneath; mandibles each with an inner basal emargination, forming a posteriorly delimited tooth. Antennae eighth-ninths as long as body, not very stout, fringed beneath to about seventh segment; scape gradually but

sub-irregularly thickened, granulose; third segment as long as next three combined, granulose-punctate, more feebly so distally; fourth to sixth rather smooth with a few shallow punctures; seventh to last irregularly sculptured or rugose-punctate; last superficially divided and with a group of short erect hairs at apex. Prothorax more than one-half again as broad as long; each side with lateral margin well defined and bearing three teeth; median and posterior teeth more pronounced and acute; disc subeven, granulose to rugose at sides and shallowly punctured in center. Scutellum rounded behind, finely punctured. Elytra somewhat narrowed posteriorly, subrounded apically; disc of each covered with low granules and bearing four low costae, the outer two very indistinct, the inner two uniting at beginning of apical fifth, then separating again immediately with inner branch going towards suture obliquely, and outer branch apparently fusing with third. Ventral surfaces finely punctured, more sparsely so on abdomen. Legs flattened; hind femora about one-half as long as abdomen; last hind tarsal segment not quite as long as first three combined. Length 43 mm.; breadth 10.3 mm.

Female: Inner notch of mandible not evident; antennae three-fourths as long as body, basal segments with a few scattered hairs beneath; prothorax with lateral teeth longer and more slender; elytra with first two costae not united, but with a suggestion of a transverse connection; fifth abdominal sternite deeply and obtusely emarginate apically. Lenth 46.8 mm.; breadth 12.7 mm.

Holotype, male (in Museum of Comparative Zoölogy), Mt. Angka, at 2150 meters, Siam, March, 1933, Asiatic Primate Expedition; *allotopotype,* female (in Lingnan N. H. Mus.), same data.

Differs from *M.* (*Aegolipton*) *marginalis* (Fabr.) in being larger, more even and flattened above, paler, with shorter and smoother antennae, distinctly toothed prothorax and longer elytra.

INTERNATIONAL CONGRESS OF ENTOMOLOGY

The ninth International Congress of Entomology will be held at Amsterdam, The Netherlands from August 17 to 24, 1951. Those who are planning to attend should obtain from the Secretariat of the IXth International Congress of Entomology, 136 Rapenburgerstraat, Amsterdam, The Netherlands a preliminary application for membership in order to insure the receipt of all circulars concerning the Congress.—Paul D. Hurd, Jr.

NOTES ON OLIARCES CLARA BANKS[1]

(Neuroptera, Ithonidae)

BY PHILIP A. ADAMS

University of California, Berkeley

This handsome insect, the only representative of its family known to occur in the Western Hemisphere, was described by Banks from a single male specimen collected at Walter's Station, California.[2] Since that time there have been no other recorded captures of the species. Mr. C. D. MacNeill has kindly presented me with a female which he took at light, three miles southwest of Parker Dam, San Bernardino County, California, on May 25, 1949. It agrees well with Banks' description, to which the following additions can be made:

Alara expanse, 44 mm.; length to tip of abdomen, 18 mm. Antennae fuscous, 9 mm. long. In the forewing the posterior branch of the media does not unite with the cubitus, but runs parallel to the anterior branch for a distance, and then forks; four branchlets running to hind margin of wing. Anterior branch of cubitus also with four branchlets to hind margin. Eighth, ninth, and tenth abdominal segments dark brown, more heavily sclerotized than others. Seventh sternite produced behind to an obtuse, heavily sclerotized point. Ninth segment with a deep longitudinal invagination, short dorsally, produced posteriad beneath to support the sand-plow, or "Psammorotrum." Psammorotrum small, slender, erect, fitting tightly against posteroventral surface of tenth segment, bearing a short tactile appendage on each side of apex. Tenth segment obtusely conical, flattened above.

Dr. Banks' specimen has the posterior branch of the media in the fore-wing fused to the anterior branch of the cubitus. Variation in the wing venation of the Neuroptera is often great, and could easily account for the difference between the two specimens. In all other respects the venation of the specimens before me checks with the description of the other. Neither specimen has the media and cubitus fused in the hind wings.

The insect undoubtedly oviposits under the surface of the sand, as do the Australian species,[3] although the hard points on the

[1]Ent. News 19, 1908, pp. 203, 204, fig.

[2]Location unknown.

[3]Tillyard, R. J., Proc. Linnaean Soc. of New South Wales, 44:427, 1919.

seventh and tenth abdominal segments, together with the small, appressed psammorotrum, indicate an ability to oviposit in somewhat harder ground. The flight is swift and moth-like.

BRISTLE DENSITY OF THE FIFTH ABDOMINAL STERNITE OF TWO HOUSE FLY STRAINS

(Diptera: Muscidae)

BY LAWRENCE L. LEWALLEN

University of California, Riverside

A comparison of the average number of bristles on the fifth abdominal sternite of a house fly strain from California and a strain from Illinois has disclosed that the Illinois strain has a higher number of bristles per sternite. The two strains under consideration are the laboratory strain from the University of California and the Hyman strain (chlordane-resistant) which was originally obtained from the University of Illinois.

The fifth abdominal sternite of one hundred female house flies of each strain and fifty male house flies of each strain was examined to obtain the averages. The California females averaged 42 bristles per sternite, whereas the Illinois females averaged 49 bristles per sternite. California males averaged 82 bristles per sternite and Illinois males averaged 89 bristles per sternite.

In computing the averages, some overlapping of figures occurred in the original data; therefore it would not be practicable to identify either strain merely by counting the bristles on the fifth abdominal sternite. However, it is interesting to note that when a series is examined, differences in the averages are evident.

TAXONOMIC NOTES ON SOME SMALLER BOMBYLIIDAE

(Diptera)

BY A. L. MELANDER[1]

The arid Southwest is especially favored with Bombyliidae. The larger and conspicuous species have found their way into museums and collections, but many of the smaller species have been overlooked. Not less fascinating, the small forms deserve attention, and would be better understood were dipterists as numerous as their colleagues, the collectors of beetles and butterflies.

In reviewing the smaller Bombyliidae of my collection I have brought together various notes and descriptions which deserve publication. The outcome of this study is presented herewith, and its importance is indicated by the announcement of the extension of two palaearctic genera, *Platypygus* and *Heterotropus*, to America, the suppression of the Old World genus *Alloxytropus* as a complete synonym of our *Prorates*, the inclusion of keys to several genera, and descriptions of thirteen new species and one new genus. The collection of Bombyliidae at the Citrus Experiment Station of the University of California, at Riverside, has been of service in furnishing data on many of these flies.

MYTHICOMYIINAE AND CYRTOSIINAE

There are a few Bombyliidae which have a single submarginal cell because the third vein is not forked. These genera are stymied in Curran's Manual at couplet 31, page 197, where provision is made only for the forms having two or three submarginal cells. The genera with reduced venation may be keyed thus:

31. One submarginal cell; anal cell open (only exceptionally closed and petiolate) ..... a

a. Second vein short, ending in first vein, or imperfect, or wanting (Mythicomyiinae) ..... b

— Second vein ending in costa well beyond first vein (Cyrtosiinae); discal cell complete ..... *Platypygus* Loew

[1]Research Associate, University of California at Riverside. Paper No. 632, University of California, Citrus Experiment Station, Riverside, California.

b. Discal cell imperfect c
— Discal cell complete ..... *Mythicomyia* Coquillett

c. Discal cell confluent with the large second basal cell..... ..... *Glabellula* Bezzi

— Discal cell confluent with the third posterior cell..... ..... *Empididcicus* Becker

Platypygus americanus Melander, new species

Length 3.5 mm.—A greatly hunchbacked, plump, quite bare, yellow species, with unforked third vein, complete discal and open anal cells. Head in profile longer than high, occiput convex with the lower angles rectangular to enclose the deep mouth opening, lower side of head nearly straight but evenly rounding opposite the proboscis into the prominent anterior mouth cavity which in profile is at a right angle to the face; antennae midway between front ocellus and oral margin, face and front in same plane, face convex from side to side, front quadrate, slightly depressed along middle; eyes obliquely oval, widely separated, minutely indented above antennae, ocelli at vertex; proboscis uniformly thick, straight, porrect, shorter than head; basal antennal joints very small, equal, third joint longer than basal two together, pyriform, with a thick cylindrical style almost as long as the joint and tipped with a microscopic seta. Abdomen about equal to the thorax, stout, last sternite globular and enveloping the genitalia. Legs without bristles. Costa thinning at wing tip beyond third vein, ambient vein thin, second vein ending midway between first and third veins, anterior crossvein just before middle of discal cell.

Wholly yellow except the black third joint of the antennae, the blackish occiput and small supra-antennal spot, and the dark brown strong wing veins. The lower occipital angles are yellow. Face, front, base of antennae, mouth cavity, scutellum, legs and halteres flavous; mesonotum opaque, marked with three incomplete broad vittae of reddish-yellow tone, the middle one abbreviated in front of scutellum, the lateral ones not reaching the humeri; remainder of body largely luteous; pleurae and abdomen shining; pubescence yellow.

Holotype: Mountain Home Canyon, on west slope of San Bernardino Mountain, California, June 3, 1946. The specimen is probably a female.

This is the first report of the occurrence of this palaerctic genus in America. While the sides of the mouth cavity are prominent they do not project so strongly as to come in the subgenus *Cyrtisiopsis* Seguy.

Empididеicus flavifrons Melander, new species

Second vein vestigial, no marginal cell, basal cells coextensive, veins largely thin and pale; legs yellow except the broad last tarsal joint; front, face, base of antennae, sides of notum broadly, much of pleurae and hind margins of abdomen yellow, more extensively so in the female; occiput, disk of thorax, scutellum and base of abdominal segments black, vestiture pale.

Front one-half wider at ocelli than at antennae, face half as long as front, anterior ocellus in advance of the others; facets uniform; third antennal joint pyriform, the thickened style half as long as the third joint; proboscis projecting half the head-height. Yellow of sides of notum broadened beside the humeri, a short dark line immediately above root of wing; pleurae centrally darkened, a yellow spot above front coxae and another in front of halteres. Yellow of abdominal segments increasing posteriorly; genitalia brown. Last joint of front tarsi forming a circular flat disk, claws black. Posterior cells 1–3 of equal extent along margin, petiole of fourth vein three-fourths length of intercalary vein, anal lobe wider than anal cell; halteres wholly ivory.

Two males, one female: Palmdale, California, March 27, 1947. The species is readily recognizable by its completely yellow front.

In the Annals of the Entomological Society of America, vol. 39, p. 455 (1946) I announced the occurrence of this palaearctic genus in California and Arizona and described three species.

GLABELLULA Bezzi

Glabellula arctica Zetterstedt has had a complicated generic history, successively appearing as *Platygaster* Zetterstedt (preoccupied, Hymenoptera and Hemiptera), *Sphaerogaster* Zetterstedt (preoccupied, Coleoptera), *Glabella* Loew (preoccupied, Mollusca) and *Glabellula* Bezzi. This little black hunchbacked fly is rare in collections and is found through Northern Europe and Siberia. What seems almost certain to be the same was described by C. T. Greene as *Pachyneres crassicornis*, from specimens from the District of Columbia, Pennsylvania and Manitoba. The American specimens have the legs black, the true arcticas have the knees and tarsi brown. The palaearctic fauna has two partly yellow species of *Glabellula* (*femorata* Loew, Turkestan, and *nobilis* Kertesz, Asia Minor) and a wholly black species (*unicolor* Strobl, Alps, which may be *arctica* with black halteres); and Malloch has described *australis* from the Philippines.

Glabellula is related to *Mythicomyia*, differing mainly in that the discal cell is confluent with the large second basal cell and

the fifth vein arises directly from the anal cell without the angulation normally to be found at the base of the discal cell. While I have collected thousands of specimens and many diverse species of *Mythicomyia*, in fifty years of collecting I have found only 19 individuals of *Glabellula*. These specimens are closely alike yet probably represent six not easily differentiated species. The flies measure one to two millimeters in length, are chunky, with flattened abdomen, black in color, the thorax more or less yellowish at the sides, with only microscopic pubescence, the legs short and antennae stubby. Like *Mythicomyia* they frequent flowers. The distinctions for the American species are given in the following table.

KEY TO THE SPECIES OF GLABELLULA

1. Notum polished, pleurae, coxae and femora shining, sides of notum narrowly yellow along notopleural suture, legs black, front and face black or brownish, abdomen wholly black, antennal style thick, its diameter one-fourth the third joint; length 2 mm. (D. C., Penn., Mont., Ida., Manitoba) ..... *crassicornis* Greene

– Notum, upper pleurae, coxae and femora subshining, knees and tarsi more or less brown, front and face bright to dull yellow, sides of thorax usually more broadly yellow along notopleural suture, expanding upward along transverse suture 2

2. Third antennal joint rotund, the style less than half as long as the joint, second vein meeting first to form a small but distinct triangular marginal cell 3

– Third antennal joint pyriform, about twice as long as deep, the style about half as long and one-third as thick as the third joint, second vein arising proximally so that the marginal cell is virtually crowded out, metatarsi yellow, abdomen wholly black; length 1 mm. (Cal.) ..... *metatarsalis* Melander

3. Wings shortened, with semicircular apex, anal and posterior veins almost as strong as anterior veins, head black, abdomen wholly black, length 1.5 mm. (Cal.) ..... *rotundipennis* Melander

– Wings with parabolic apex, posterior veins weak and translucent 4

4. Antennal style one-fourth as thick and nearly one-half as long as third joint, abdomen subopaque black; length 1.24 mm. (Cal.) ..... *pumila* Melander

– Antennal style thin, one-sixth as thick and much less than one-half as long as third joint; abdominal segments with more or less evident yellowish hind margins 5

5. Yellow of hind margins of abdominal segments somewhat triangularly widened laterally, abdomen dull. (Mont., Ida., Wash.) ..... *fasciata* Melander

– Hind margins uniformly and narrowly yellow, abdomen shining (Cal.) ..... *nanella* Melander

Glabellula fasciata Melander, new species

Male. Length 1.2 mm. Depressed yellow part of front reaching almost to anterior ocellus, with central black spot; face yellow almost to oral margin; proboscis slightly projecting; third antennal joint rounded oblong, one-fifth longer than deep, style about one-fourth as long as third joint. Humeri, spot at transverse suture and posterior calli light yellow; upper pleurae mostly yellow. Sixth and seventh tergites tipped with uniform yellow margin, segments two to five marked only with yellow lateral triangles progressively increasing in size. Legs blackish, knees narrowly brownish. Wings hyaline, anterior veins dark brown, other veins translucent; knob of halteres yellowish.

Female. Sides of mesonotum widely yellow, mesopleura with large diamond-shaped yellow mark, humeral mark extending down to front coxae and back along upper pleurae to below wing. Yellow lateral marks of abdomen larger than in male, those of fifth segment meeting.

Holotype and allotype: BLEWETT PASS, CASCADE MOUNTAINS, WASHINGTON, July 17, 1920. Seven *paratypes:* with the types; Kamiac Butte near Pullman, Washington, July 25, 1914; Moscow Mountain, Idaho, July 13, 1907 and Saltese, Montana, August 22, 1916.

Glabellula metatarsalis Melander, new species

Female. Length 1 mm. Front yellow almost to anterior ocellus but with a round black supra-antennal spot, face yellow to the black cheeks, carinate, half as wide as the front; antennae longer than in the other species, style one-third as thick as last joint; proboscis scarcely protruding. The short pubescence of notum, scutellum and abdomen white, notum shining black, humeri and posterior calli light yellow, notopleural suture dull yellowish, encroaching on transverse suture and on pleurae; pleurae mostly black, an oval yellow spot over front coxae and an irregular line over the others. Abdomen wholly black. Legs black, apex of femora fuscous, metatarsi yellow. Wings hyaline, apically semicircular, anterior veins brown, others translucent; halteres white, the stalk dull yellowish.

Holotype: BOREGO, CALIFORNIA, April 3, 1946. *Paratype:* Palm Springs, California, April 3, 1925, on mesquite, P. H. Timberlake, collector, in Citrus Experiment Station.

Glabellula nanella Melander, new species

Male. Length 1.25 mm. Depressed area of front three times as wide as high, not attaining front ocellus, yellow, with a round black supra-antennal spot, face yellow on upper two-thirds; proboscis scarcely projecting; third antennal joint rotund, style one-fifth as long and one-sixth as wide as third joint. Humeri, lateral spot at transverse suture and postalar calli pale yellow; humeral spot extending down on pleurae to base of front coxae and horizontally to root of wing, a horizontal yellow line across top of ster nopleura. Hairs of abdomen brownish, venter black. Legs black, knees yellowish extending on both femora and tibiae, hind metatarsi brown. Wings hyaline, anterior veins blackish, posterior veins thin and translucent, marginal cell very small, twice as long as its greatest width, apex of wing almost semicircular.

Holotype: CAMP ANGELUS, on the west side of SAN BERNARDINO MOUNTAIN, CALIFORNIA, elevation 5800 feet, May 26, 1947. A crushed specimen from the South Forks of the Santa Ana River, about eleven miles east of Camp Angelus, elevation 6250 feet, June 19, 1945, is probably the same, but the incisures of the shining abdomen do not show yellow.

Glabellula pumila Melander, new species

Male. Length 1.25 mm. Depressed area of front twice as wide as long, dull yellow, with a round median black spot, upper half of face dull yellow; proboscis scarcely projecting; third antennal joint circular, style relatively stout. Humeri, postalar calli and connecting line yellowish, notal pubescence short and grayish, pleurae finely coated except center of sternopleura, the yellowish marks of pleurae vague. Abdomen almost completely black, only a linear indication of pale hind margins at the sides. Knees and hind metatarsi brown, rest of legs black. Wings hyaline, anterior veins blackish, posterior veins thin, pedicel of third vein (i. e. underside of marginal cell) half as long as following section, posterior crossvein of same length as anterior crossvein, apex of wing paraboloid.

Holotype: MILL CREEK in the SAN BERNARDINO MOUNTAINS, CALIFORNIA, at elevation 6000 feet, July 18, 1947, on *Rhamnus californica*, collected by P. H. Timberlake, in collection of Citrus Experiment Station. Without knowledge of the extent of variability in *Glabellula* this specimen is given species rank. The dimensions of the antennal style and third joint seem to be fairly constant in the genus and in this instance set *pumila* apart from its nearest relatives, *nanella* and *fasciata*.

(Continued)